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Telephone: WHitehall 9233 (20 lines) Telegrams: "Trazette Parl London"

BRANCH OFFICES

GLASGOW: 139, Bothwell Street, C.2 Central 4646
NEWCASTLE-ON-TYNE: 21, Mosley Street Newcastle-on-Tyne 22239
MANCHESTER: Century Insurance Building, St. Peter's Square Central 7667-8-9
BIRMINGHAM: 90, Hagley Road, Edgbaston Edgbaston 2466
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Railway Participation in Air Services

AQUISITION by the British Transport Commission of an interest in Silver City Airways, on which discussions are taking place, as recorded last week, could lead to closer co-operation between rail and air in services. It is not likely to lead to any revolutionary change in the relationship between the railways and air transport undertakings. British Railways already co-operates with Silver City Airways in the London-Paris "Silver Arrow" service via Manston and Le Touquet, in conveying passengers between Victoria and Margate, where there are motorcoach connections to and from Manston Airport, and in services to the Isle of Man via Squires Gate station and airport, near Blackpool. There are several British European Airways services via Gatwick Airport, associated with train travel between the adjacent station and Victoria. In addition, the railways are called on at short notice to move passengers between London and Dunkirk or Calais, London and Glasgow, and so on when flights are cancelled in bad weather. Railway participation in air undertakings is not uncommon. A notable example is South African Airways, a part of, and operated by, the South African Railways administration. Until they were debarred by the Transport Act of 1947 from operating air services, the four British main-line

companies were active in passenger air transport. Sir John Elliot, a former General Manager of the Southern Railway, in a letter to *The Times* last week, pointed out how active they were. In 1934 Railway Air Services was formed, with Sir Harold Hartley, then Vice-Chairman of the London Midland & Scottish Railway Company, as Chairman, and the Assistant General Managers of the other three companies as Directors. This was followed by Channel Islands Airways Limited, owned and operated by the Great Western and the Southern Railways. Until the outbreak of war in 1939, these undertakings between them worked the only large daily scheduled air network in the United Kingdom, and later became the basis of the British European Airways services of today. This participation in other forms of transport on a large scale had begun after the first world war with the investment by the four companies of large sums in bus and road haulage undertakings. The closer the partnership in, though not necessarily the complete ownership of, the various forms of transport, as Sir John Elliot states, the more comprehensive and convenient will be the service to the community, and there will still be ample scope for healthy competition.

Area Board Changes

NEXT April changes take place affecting two Area Boards of the British Transport Commission. Lord Rusholme, who has been a full-time Member of the Commission from the inception of that body, in 1947, until last September, while remaining a Member of the London Midland Area Board will relinquish its Chairmanship. He was the first holder of that office when the Board was formed in January, 1955. His place will be taken by Sir Reginald Wilson, who moves from the Eastern Area Board, of which he has been Chairman since 1955, and remains a full-time Member of the B.T.C.; he was appointed Comptroller of the B.T.C. on its formation, and became a full-time Member in 1953. Maj.-General G. N. Russell, the new Chairman of the Eastern Area Board, was a Member of that body from 1957 until joining the London Midland Area Board last October. He was the first Chairman of the Road Haulage Executive. As General Manager & Chairman of the Management Board of British Road Services, he was subsequently responsible for the return to private enterprise of a considerable part of the fleet, as well as maintaining a high level of efficiency of the resultant smaller organisation.

Mr. S. G. Hearn

MR. SIDNEY GEORGE HEARN, Assistant General Manager of the Eastern Region, British Railways, since January, 1958, is retiring. Early in his railway career he was selected as the first Traffic Department Candidate of the Great Western Railway to undertake special training. This gave him an intimate knowledge of that system, and formed a foundation on which he was to build an outstanding career lasting nearly 50 years. The greater part of Mr. Hearn's service has been spent with the Great Western Railway and the Western Region of British Railways. For eleven years, from 1940 to 1951, he was in the office of the Superintendent of the Line at Paddington. In 1951, he became Operating Superintendent of the London Midland Region. In November, 1955, Mr. Gilbert Matthews, Chief Operating Superintendent, Western Region, retired, and it was a happy choice that Mr. Hearn should be recalled to Paddington, at the special request of the British Transport Commission, to become head of the Operating Department. Since the war, Mr. Hearn has served as the operating member of railway study groups which visited the U.S.A. and France.

Reduced Rates on East African Railways

BECAUSE of a general improvement in the net revenue position brought about largely by a more intensive use of wagons, East African Railways & Harbours has made several reductions in freight rates. The maximum rate for the carriage of goods has been reduced from 40 cents to 38 cents per ton mile. Alterations have been made also to the method of charging for the carriage of petrol and other oil products. Petrol, for instance, was previously charged at 40 cents per ton mile, plus a separate charge for the return

haulage of the empty tank wagon. The new rate of 39 cents per ton mile for petrol includes the return empty haulage element. The result is a substantial reduction in the freight charges for petrol to all points of East Africa. Alterations have also been made, in a similar way, to the charges for carrying kerosene, gas, diesel and fuel oil, but these result in no substantial change in the overall transport costs of these products. These changes in the Railway tariff came into effect on January 1, 1960.

Overseas Railway Traffics.

CANADIAN Pacific Railway revenue for November 1959, amounted to \$39,035,502 compared with \$40,245,952 in November, 1958. Railway expenses were \$34,816,175 (\$34,992,794) resulting in net earnings of \$4,219,327 (\$5,253,158). Aggregate net earnings for the 11 months January-November, 1959, were \$31,578,191, compared with \$31,546,121 in the corresponding period of 1958. Operating revenues of the Canadian National Railway for the month of November, 1959, amounted to \$58,161,000. Expenses, taxes, and rents totalled \$60,637,000 resulting in a net operating income deficiency for the month of \$2,476,000. In November, 1958, operating revenues were \$56,098,000; expenses, taxes, and rents were \$64,068,000, and the net operating income deficiency was \$7,970,000. Expenses for the month of November, 1958, included a provision of \$9,300,000 for wage increases. East African Railways & Harbours approximate railway revenue for the month of November, 1959, was £1,504,000, as compared with £1,543,000 in the same month of 1958. The main decrease was in goods receipts, which fell by £31,000; passenger and other coaching traffic fell by £10,000, and road services by £4,000. Receipts from livestock traffic increased by £4,000, from inland marine services by £2,000, and from hotels and catering services by £1,000.

Diesel Services from and to St. Pancras

THE cheap fares now available over the St. Pancras to Bedford line of British Railways, London Midland Region, were referred to briefly last week. The diesel trains which came into operation last Monday afford a much better service. Details are given elsewhere in this issue. An improvement has been made in the morning and evening peak hour service, made possible by the reduced headway needed by the diesel trains through the two-track bottleneck between Kentish Town and Finchley Road. Some diesel timings are faster than those to and from any other London terminus over a corresponding distance, as for example 21 min. for the 19.9 miles from St. Albans to St. Pancras, 26 min. for the 24.6 miles from Harpenden, and 23 and 28 min. respectively in the down direction. From Luton steam timings of 30 min. for the 30.2 miles to St. Pancras have been in operation for some time. With adaptation for passenger working of the goods lines between Harpenden Junction and Millbrook, south of Bedford, and the new passenger platforms on the latter tracks at Luton, Leagrave Harlington, and Flitwick, the new diesel trains have had surprisingly little effect on the main-line passenger service. A half-hourly diesel service is also operating between Kentish Town and Barking. Connections at Kentish Town, however, are not good, especially with the stopping diesel trains between St. Pancras and Luton.

Mixed Gauge in Switzerland

AN example of mixed-gauge working is seen still in Switzerland between Bremgarten West and Wohlen, a junction on the route from Lenzburg to Lucerne through Rotkreuz, completed throughout in 1881. To connect Bremgarten with the then growing general railway system, a standard-gauge line, four miles long, was opened to Wohlen in 1876. In 1882 it was made over to the old Swiss Central Company, becoming later part of the Federal Railways. In 1902 a privately owned metre gauge electric line, 6½ miles long and operated at 1,000 V. d.c., was opened from Dietikon, on the Zurich-Baden line, to a station in Bremgarten on the opposite side of the River Reuss to the Federal Railways terminus. In 1912 a bridge was built, mixed-gauge track laid thence to Wohlen and the working transferred to the electric railway company. The passenger services were thereafter operated

by its narrow-gauge stock but a small standard-gauge locomotive was provided to work goods trains between Wohlen and Bremgarten West, where the track and all points and crossings are still of three-rail pattern. During repairs to this locomotive recently a Federal Railways steam tank engine took over its duties.

Well-presented Facts and Figures

BOOKLETS giving facts and figures relating to their own systems are produced annually by railway managements in several countries. Notable examples sent to us are those about British Railways and the Japanese National Railways. A particularly useful publication is that of the Central Railway of India. It seems to be based, as regards format, line illustrations, and statistical graphs, on "Facts and Figures about British Railways," published by the British Transport Commission. It is bigger (80 pages against 44), and goes into greater detail. Among the many matters treated are construction of the Khandwa-Hingoli link between the northern and southern metre-gauge systems, co-ordination of rail and road services, the railway safety campaign, medical and staff welfare facilities, electric power supplies, re-signalling, and improved goods services. The booklet presents in readable form a fairly full report of the Central Railway during the year in question. The latter is 1958-59; because of printing delays, a copy has only just reached us, though it was signed on August 1 last by the General Manager, Mr. R. B. Lal. It is obtainable free from his office at Victoria Terminus, Bombay.

Railways into Roads

AQUISITION by the Norfolk County Council of stretches of the former Midland & Great Northern line for building a main road may prove to be the first of a good many conversions. Although a single line affords a strip roughly only 20 ft., and a double line one 30 ft. wide, the high value and scarcity of land in some areas, apart from the problem of embankments, cuttings, and bridges and other structures, may cause local authorities to welcome opportunities of buying the right of way of abandoned lines. The M.G.N. line, traversing flattish country, is exceptionally free from major structures. A double-track strip can yield land for half the width of a major road. Railways are easily graded, and it often may be worth while to fill shallow cuttings so as to afford surface junctions with roads which crossed the railway on overline bridges and to avoid the cost of widening the bottom of the cutting. The greatest difficulties are likely to be tunnels and embankments. It is unlikely that any other long, and probably, therefore, important stretch of line will be converted in this way.

Properties of Concrete Sleepers

CHANGING economic and supply conditions created by the last war, some of which persisted after it, made it essential to find an alternative material to timber for sleepers. If possible, this would have to meet not only the exacting demands of the civil engineer but also enable the signal engineer to continue to use track circuiting without difficulty. The way in which concrete became applied in Great Britain from steps instituted in 1941, leading to the production of satisfactory forms of sleeper and eventually to the development of insulating attachments meeting signalling requirements with adequate reliability, was described in a paper read before the Institution of Railway Signal Engineers on January 6 by Mr. E. Morgan, of the Research Department of British Railways. The details of the carefully conducted trials at selected locations, including direct comparison with timber sleepers track, and the continuous records taken over a considerable period were of particular interest. They served to emphasise the value of the work now being carried out in this and other fields, the results of which already are noticeable in several directions.

Problems of Insulating Sleepers

THE discussion on Mr. Morgan's paper brought out some of the peculiar conditions encountered in investigating the several problems, some not yet resolved. Even the behaviour of some sections of track circuit used to make comparisons

and carried on timber sleepers was not easy to explain. While considerations of economy and availability of timber supplies continue to influence the situation, the use of longer rails, at times welded into appreciable lengths so as to achieve better and quieter running, was shown to have an important bearing on the use of concrete sleepers, the number of which is likely to increase greatly in the next few years. Several designs of fastening and insulating fittings have been produced, and others are stated to be on trial. It was natural that the wish should be expressed that insulations might be dispensed with and the sleepers themselves possibly improved in some way to become the equivalent of timber in insulating properties.

Swiss Transportable Signalbox

TRANSPORTABLE signalboxes for emergency use, for example to replace one destroyed in war or to meet some special temporary need, have been used from time to time, especially on the Continent. Elsewhere in this issue is published a description of an application of the idea to temporary single-line working on the normally double-track Gotthard line of the Swiss Federal Railways. Conditions there are such that engineering maintenance and renewals can be carried out efficiently and economically only by having absolute possession of one track for an appreciable period but over a distance not long enough to cause any noticeable interference with the traffic. To meet these two requirements the limit of the single-line working often has to be placed between stations, necessitating an additional temporary set of points with protecting signals and appropriate block signalling arrangements. The Gotthard equipment, as our article shows, has been very carefully designed to render it not only easily transportable from place to place but readily adapted to any one of the four layouts that may prove necessary. It has already proved very successful and is to be increasingly used in the future.

Closing of the Oldest Passenger Railway

AFTER a working life of more than 150 years, the Swansea & Mumbles Railway, the first line in the world on which fare-paying passengers were carried, was closed completely last week, and is being dismantled. Authorised from Swansea to Oystermouth in 1804, the line opened for goods traffic in 1806, and was worked by horses for many years. A passenger service, provided by a contractor, was introduced on March 25, 1807, and continued until a new road was made round the shores of Swansea Bay some 20 years later. Passenger services were resumed in 1860, and steam traction was introduced in 1877. An extension to Mumbles Pier was completed in 1898. The railway was electrified in 1929, with vehicles of the tramway type, after it had been leased to the South Wales Transport Co. Ltd. Replacement of the railway by bus services became inevitable after the end of the second world war, when a progressive decline in passenger traffic and increased cost in maintaining the ageing track and rolling stock made its continued operation uneconomic. Powers to abandon the line were obtained last year, and the land on which it ran has been presented to the local authority for road widening and the improvement of the promenade at Mumbles.

Signalling on the Mumbles Railway

THE automatic signalling and automatically trailable facing point locking on the Swansea & Mumbles Railway had been designed specially for the line on its electrification. Until then, no doubt, under some understanding come to originally with the Board of Trade, the line had been worked on tranway principles without any signalling; but it was seen that some would have to be provided if electrification was to bring the advantages hoped for, especially as it was desired to avoid having to observe a very low speed restriction over all facing points. The latter accordingly were fitted with locks, with detecting colour-light signals, removed automatically by a trailing movement. The single-line sections were protected by three-aspect illuminated enclosed disc type signals, operated from overhead contact makers by the passing car pantographs, the current coming from the traction circuit. A modified form of these special signals was in use also for a time on one section of the former Dublin United Tramways.

Power Position in Switzerland

IT is estimated that between October 1, 1959, and April 30 1960, the Swiss Federal Railways will have consumed about 750 million units of electric energy, or 3.5 million a day. The management owns seven power stations and a share in two others; it also obtains current from private suppliers. The weather during the last two summers varied considerably. In May, 1958, there were abundant reserves of water and in October the situation could be regarded as satisfactory. That winter, however, the snowfall was less than usual and the dry summer of 1959 caused further anxiety. Arrangements had to be made to obtain additional help from outside sources, including the German Federal Railway, which owns steam-driven stations. October in that year remained comparatively dry and the levels in the reservoirs were appreciably below normal. It is hoped that rain will once more fall sufficiently to retrieve the position; but in the meantime strict instructions have been issued to the staff explaining in what ways they can co-operate to eliminate all unnecessary consumption of power. If these are obeyed it is expected that it will prove possible to avoid cutting the train services, which would certainly have undesirable reactions.

B.T.C.'s Pledge to Unions

AN important statement of policy in regard to the impending report of the Guillebaud Committee and the current wage negotiations with the railway trade unions was made by the British Transport Commission earlier this week. This statement, published in full in this week's Staff & Labour section, contains the information that the Guillebaud Report is expected during April, 1960, and that, in view of the prevailing disappointment at the length of time which its compilation is requiring, the Commission will be prepared immediately on its receipt to discuss with the unions what interim action may justifiably be taken. It would, moreover, be prepared to make any such interim action take effect as from January 11, the date of the statement. The Commission also states that it cannot declare its attitude to the Guillebaud Report until this has been received and studied. The terms of reference of the Committee provided that "neither the Commission nor the trade unions can enter into any prior commitments on the report of the independent body but the parties recognise that, without a genuine desire to reach a reasonable settlement of pay issues, the object of setting up the inquiry will not be achieved." In other words, the Commission, while offering definite hope to the unions, has not bound itself to make any increase. Indeed, during the discussion which took place at the press conference at which the statement was made public, Sir Brian Robertson, Chairman of the Commission, made it clear that no increase would be made if the Guillebaud Report contained no recommendations to this effect.

Nevertheless, the signs are that the unions need not fear that the hopes which undoubtedly have been raised by the statement will suffer complete deflation. On the committee's side, it must be remembered that the inquiry does not constitute a pay claim as such, but an impartial process of job analysis and assessment with reference to responsibility carried and pay received relative to that obtainable for comparable work outside the railway structure. Under such an investigation, when all the work under review is considered in detail, it is extremely unlikely that an overall recommendation, one way or the other, can result; indeed, the value of the investigation, which is the first of its kind ever to have taken place on British Railways, lies in the immense amount of information it is expected to have uncovered. There is no doubt that, so far as job analysis is concerned, this will become the basis for negotiation for many years to come and its compilation accordingly cannot in any circumstances be hurried. That the work has taken longer to complete than was originally estimated offers no adverse reflection on the investigators, but rather pays tribute to their thoroughness. This was publicly recognised on January 1 this year by Mr. S. F. Greene, General Secretary of the National Union of Railwaymen, who on that date wrote in *The Railway Review*: "I agree that this inquiry has taken longer than I anticipated, but this is no reflection on the three members who were prepared to undertake this task at the request of the B.T.C. and the unions

jointly. . . . I would like to point out that to be on the Pay Inquiry Committee was no sought-after job, and to find three people with the standing, knowledge, and experience and, above all, prepared to give the time necessary, was not without difficulty."

On the Commission's side, there is no doubt that there is considerable sympathy with the men's claims, although this sympathy must of necessity be tempered by an ever-present realisation of the dire financial position of the railways. After giving the statement on wages and salaries, Sir Brian Robertson added that it represented a considered decision of the Commission and was not put out in response to any threats of local strike action. The Commission was entitled to expect that the National Executive of the trade unions would be supported by their members: sound industrial relations were not possible on any other basis. He stressed the importance of a favourable public reaction to work done by railwaymen. "In the last weeks of 1959, all traffic was very heavy. Indeed to cope with it, many of our men have been working long hours, very hard, under difficult conditions. They deserve thanks, not just from the Commission and myself, but also from the public, and it is on the good will of the public more than anything else that the future prosperity of the industry and of those who work it depends." He went on to say that the Commission has always recognised that a contented staff, proud of its job and adequately rewarded for its work, is an essential part of the modernisation plan. That is no new statement—it can be found in the Commission's report for 1958. He concluded his remarks by saying that, in asking the staff now to exercise a little further patience, he reminded them that both the Commission and the staff need the support of public opinion in their efforts to gain this objective.

The Peak Passenger Traffic Problem

THE ultimate answer to the problem of peak passenger suburban traffic, especially that of the London area, in the view of Mr. P. A. White, Line Traffic Manager, South Eastern Division, British Railways, Southern Region, is not to be sought within the sphere of public transport alone, nor in the spheres of business or season-ticket travel in isolation. A new design for living is needed in London and not merely a new transport policy. This can only be based on a foundation set by all the interested parties. His views are expressed in his paper, "The Problem of the Peak," read to the Institute of Transport last Monday. Public transport brings over 1,000,000 passengers into London every workday morning and conveys that number back each night. Of the 2,500,000 journeys, the Southern Region London termini handle over 25 per cent. To convey these travellers approximately 1,200 trains are run by the Southern during business periods. In 1939 the seven terminal stations in London operated by the Southern dealt with nearly 500,000 during business periods each weekday. Of this, 235,000 passengers compressed themselves into the busiest hour of the morning and of the evening. Twenty years afterwards, continuous improvements in services by way of higher capacity trains, longer trains and even more trains have failed to dent the bulge. The number of passengers is up by 23 per cent in the business periods and now amounts to about 600,000 journeys every day. During the two busiest hours, morning and evening, over 15,000 more seats are now provided, an increase of 6 per cent, but passengers now total about 360,000, or 52 per cent, more than in 1939. Off-peak demands have actually declined and the overall increase in daily traffic is only 15 per cent higher than before the war.

A London address continues to attract more and more firms; since 1952 the number of jobs in London has increased by 250,000. During the same time, however, another 250,000 people have moved out to dormitory areas. There has been, Mr. White points out, a reduction in terms of real money in the price of season tickets which, since 1939, have risen on an average only some 120 per cent, compared with 170 per cent in the cost of living as a whole. Every time the Southern electrified network has been extended, new areas have become ripe for residential development and large-scale population increases have resulted. There is no room for more trains over the tracks at peak hours. The possibilities of improving line capacity by electrification, colour-light signalling, flyovers, or the use of multiple-unit stock to reduce turn-round time at ter-

minals—all have already been exploited on a very large scale on the Southern Region London lines. Even the recent introduction of the first phase of electrification to the Kent coast did not allow any substantial increase in the total number of business trains. The elimination of steam and the introduction of multiple-unit trains made a minor contribution to the problem but the tracks on the approaches to London were already being worked to their maximum capacity. The double-deck train is not a success, because of the time needed for loading and unloading passengers. Lengthening eight-car trains to ten cars on trains on certain routes has involved construction of new rolling stock, lengthening of station platforms and alteration to signalling and permanent way layout, at a capital cost exceeding £3½ million. By the time the scheme was completed, the growth and greater concentration of business travel had cancelled out any advantage expected from the longer trains, though overcrowding is not as serious as it otherwise would have been. Any notion that heavily loaded trains are highly profitable must be dispelled by the fact that, apart from the light loading of trains once clear of the inner suburban area, the whole of the system within the London area is geared primarily to serve the few hours of daily peak traffic.

As to limiting the trend towards even greater traffic peaks, Mr. White rules out any direct attempt to force traffic into the off-peak by legislation as impracticable. The differences between peak fares and lower off-peak fares are not great enough, he maintains, to overcome considerations of convenience in the hours of travel. For various reasons, staggering working hours is unlikely to be adopted to any great extent. Construction of satellite towns has had no perceptible influence on traffic to and from London.

Meanwhile, in the area served by the Southern Region, the increase expected in the population over the next 10-15 years is 650,000, or over 100,000 in the number of daily travellers. In Kent alone the increase is estimated to produce a further 50,000 railway passengers to London and back each day. This would be well beyond the limit of what is practicable without a complete remodelling of the railway system, and an expansion of operating facilities on a scale not yet contemplated. Already overcrowding is more acute in Kent than elsewhere in the Region and this position is aggravated by transfer of traffic between the terminals at Charing Cross and Cannon Street and the Central Section stations via London Bridge.

The Safe Life of Rails Examined

RECOMMENDATIONS which highlight problems already receiving urgent attention by railway civil engineers and based on a detailed study of known causes for the failure of rails are made in a paper "The Strength of Rails with Particular Reference to Rail Joints," by Messrs. S. Wise, D. Lindsay, and I. G. T. Duncan, read before a joint meeting of the Institutions of Mechanical and Locomotive Engineers in London earlier this week. The three authors are in the Research Department of British Railways, British Transport Commission, and the only rail sections considered are the 109-lb. f.b. and R.B.S. 95-lb. b.h. rail, both in common use on British Railways.

The f.b. rail sections were designed with a high moment of inertia giving strength to resist longitudinal bending but with relatively thin webs and sharp fillet radii which are not ideal for resisting shear stresses, particularly when the head load is eccentrically applied. For this reason a limited quantity of sections with a thickened web has been rolled for test purposes in line with the author's belief that it may be worth while to introduce such a revised version of the 109-lb. f.b. rail at locations where corrosion is severe and maintenance difficult, for example, at or near water troughs and in tunnels.

Although a table showing the calculated permissible wear of rails makes it apparent that the f.b. rail is superior to the b.h. section from the point of view of longitudinal bending, it is suggested that, in practice, other features may limit the life of the former section. An indication of the desirability of investigating the stresses at fishbolt holes in both sections is obtained from an analysis of the failures which have occurred in rails laid by British Railways since 1950.

Early dynamic-stress investigations about five years ago at Duffield, London Midland Region, using wire-resistance strain gauges and cathode-ray oscilloscope equipment, enabled

two records to be taken in immediate sequence of the fishbolt hole strains in a f.b. joint and a b.h. joint as both sections were already laid abutting. This made possible a true comparison as the effect of such factors as the suspension and weight distribution of individual locomotives and coaches was equalised. The locations of maximum stress in the bolt holes were established from theoretical calculations which took no account of the effect of the fishplates but were subsequently proved correct. Clearance for attaching the strain gauges there was made by using high-tensile fishbolts of reduced diameter.

The first of two principal features to emerge from this work was that the magnitudes of stresses induced by the wheels of steam locomotives varied markedly one from another even for wheels of identical diagram weight under any one locomotive and for wheels identically placed under different locomotives of the same class travelling at the same speed. Secondly, in both sections of rail, the highest individual stress and mean stress range values were found at the first running-on bolt hole position. The last observation greatly simplified the subsequent work at Duffield of examining 20 joints in both f.b. and b.h. rails to select in each section a typical joint which gave a stress range nearest to the mean of the others. On those two joints a full test programme was carried out and, among other things, it was found that for both sections the mean stress values increase markedly when the joint sleepers are over- or under-packed especially in the case of running-on fishbolt holes. As a result, because of the remarkably wide mean stress range values observed, the effect of bad maintenance on a joint might be to raise the value of the mean stress to a level approaching or even exceeding the fatigue limit. With normally-packed typically-stressed joints there is little difference between the two sections in the magnitudes of the mean stress ranges but the slightly higher figure of 5.77 tons per sq. in. for 109-lb. f.b. rail, compared with 5.09 for 95-lb. b.h. rail, is thought to be associated with the thin web mentioned previously.

At Duffield it was also observed that the mean value of the stress range for the passing of steam-locomotive wheels over a well-maintained joint do not greatly exceed that for coach wheels despite the much larger axleloads of the former. This was thought to be because of the greater diameter of the steam-locomotive wheels. But similar tests carried out at Newton on the Manchester—Sheffield—Wath electrified line showed that a considerable percentage of the stresses which arose during the passing of electric locomotives over typical f.b. rail joints exceeded 12 tons per sq. in. In the circumstances even a small deterioration in joint maintenance could bring a substantial proportion of the stresses above the fatigue limit for corroded rail steel and so reduce the life expectancy of the rails below that presently set by recognised criteria. Also it was found that it is unjustifiable to assess stresses at higher speeds for electric and diesel locomotives by extrapolation from results obtained at intermediate speeds.

In the laboratory, fatigue testing of rails under cyclic vertical bending loads was carried out as a corollary to the service stress measurements. Special arrangements were made to detect the first onset of cracking in the fishbolt holes, resulting from shear stress, as the time for crack propagation to half way through the head and foot, before complete failure occurred, was relatively long. The maximum dynamic stress that can be permitted in the holes if fatigue failure is to be avoided in service was found to be 17.0 tons per sq. in. The fatigue strength in new drilled rails was improved 50 per cent by work-hardening the surface of the holes and this was only diminished to 44 per cent by subsequent exposure to corrosion. Further tests showed that a reduction in the bolt hole diameter to the smallest practicable size increases the fatigue strength by about 10 per cent.

Among the conclusions reached by the authors is the fact that the rail sections standardised by British Railways are of sufficient strength for long life under existing steam traffic where maintenance is good and corrosion not severe. But, they believe that rail life should be governed by the type, speed and quantity of traffic carried rather than by loss of weight. Furthermore, they suggest that any practical way of altering rail joints to increase their life should be investigated and that the development of special joints for the ends of welded rails would appear necessary irrespective of any stress-relieving requirement.

British Transport Commission Traffic Receipts

PASSENGER receipts of the British Transport Commission carrying undertakings followed, during the last complete four-week period of 1959, much the same pattern as in Period 13 of 1958. The incidence of Christmas made some difference. In 1958, there was one more day, the Wednesday (Christmas Eve), of intensive passenger traffic, which would tend to increase British Railways receipts for these four weeks in that year, even allowing for advance booking by those who went away for the holiday. Against this, the increase in railway fares on November 1, 1959, might have been expected to result in higher passenger receipts. Nor, in view of reports of heavy traffic to the Continent, is it clear why ships' passenger receipts in Period 13 of 1959 were £22,000 less than a year previously.

	Four weeks to Dec. 27, 1959		Incr. or decr.	Aggregate for 52 weeks		Incr. or decr.
	1959 £000	1958 £000		1959 £000	1958 £000	
Passengers—						
British Railways	10,533	9,693	+ 840	139,716	137,631	+ 2,085
London Transport						
Road Passenger Services	4,276	4,018	+ 258	54,933	48,495	+ 6,438
Railways	1,979	1,829	+ 150	23,809	24,348	- 539
Provincial & Scottish Buses	4,197	4,102	+ 95	60,644	59,897	+ 747
Ships	263	285	- 22	7,474	6,901	+ 573
Total Passengers	21,248	19,927	+ 1,321	286,576	277,272	+ 9,304
Freight, Parcels & Mails						
British Railways						
Merchandise and livestock	7,876	6,992	+ 884	99,472	103,021	- 3,549
Minerals	3,764	3,264	+ 500	44,597	44,973	- 376
Coal & coke	8,712	9,236	- 524	108,558	121,734	- 13,176
Parcels, etc., by coaching train	4,376	4,026	+ 350	54,038	52,781	+ 1,257
Total freight	24,728	23,518	+ 1,210	306,665	322,509	- 15,844
British Railways	4,307	3,833	+ 474	55,692	53,691	+ 2,001
Others						
Total Freight, Parcels & Mails	29,035	27,351	+ 1,684	362,357	376,200	- 13,843
Total	50,283	47,278	+ 3,005	648,933	653,472	- 4,539

The improvement in merchandise and mineral traffic continued. Merchandise and livestock receipts at £7,876,000 compared well with the corresponding figure for the previous year. A decrease compared with the total for Period 12 (£8,673,000) would be accounted for by the Christmas holiday. Mineral receipts at £3,764,000, against £3,264,000 for Period 13 of 1958, reflect the increased activity in the steel industry. Coal class traffic continued to decline. Receipts for Period 13 were £8,712,000, compared with £9,236,000 in 1958. The usual activity in the collieries on the days immediately before Christmas was reported in some colliery districts, so that coal receipts for the period are greater than would be expected in view of the Christmas holiday.

Aggregate traffic receipts of the Commission for the 52 weeks of last year ended December 27 at nearly £649 million were £4.5 million less than for the same period of 1958. The gap has been narrowed, for it was £8 million at the end of Period 12 and over £9 million four weeks previously.

PERCENTAGE VARIATION 1959 COMPARED WITH 1958

	Four weeks to December 27	52 weeks to December 27
British Railways:		
Passengers	+ 8.6	+ 1.5
Parcels	+ 8.6	+ 2.3
Merchandise & livestock	+ 12.3	- 3.4
Minerals	+ 15.3	- 0.8
Coal & coke	- 5.6	- 10.8
Total	+ 6.1	- 2.9
Ships (passengers)	- 7.7	+ 8.3
British Road Services, Inland Waterways & Ships (cargo)	+ 12.3	+ 3.7
Road Passenger Transport, Provincial & Scottish	+ 2.3	+ 1.2
London Transport:		
Railways	+ 8.2	- 2.2
Road services	+ 6.4	+ 13.2
Total	+ 6.9	+ 8.0
Aggregate	+ 6.3	- 0.7

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Introduction of Diesel Traction

January 7

SIR,—I was very interested to read in your issue of January 1 of the progress that has been made in diesel operation in the North Eastern Region.

I found Mr. Hick's article most stimulating. The improvement in the gross receipts which he quotes follows the trend that we ourselves have enjoyed when diesel railcars have been introduced. For the record, however, I would mention that at the four weeks ended November 1, 44½ per cent of the passenger mileage on the Great Eastern Line was operated by diesel traction, the remainder being worked 25 per cent by electric and 30½ per cent by steam traction. At the same time, 42 per cent of our freight mileage was operated by diesel traction.

I feel your readers will be interested to learn of the extent to which diesel traction has been introduced on to the Great Eastern. We expect to achieve a further considerable increase in diesel operation of both passenger and freight mileage during 1960.

Yours faithfully,

W. G. THORPE
Line Traffic Manager (Great Eastern)

British Railways, Eastern Region,
Bishopsgate, E.C.2

The Road & Rail Association

December 17

SIR,—It is regrettable that in your December 11 issue you should give such a hostile reception to the Road & Rail Association. It would seem that the Association, like the public, is disturbed by the uneconomic use of the railways, and the overcrowding of roads by so many goods vehicles, which lead to agitation for building new roads alongside under-used railway routes.

While the belief is held by so many people in the Ministry of Transport, the British Transport Commission, and among other operators of transport, that transport is a competitive business and not a public service, it follows that most ideas and suggestions originating from within the Institute of Transport slavishly adhere to this doctrine.

Perhaps the new Road & Rail Association will be given a chance to present a new approach on the subject which may take into account the interest of members of the public, all of whom are indirectly or directly users of freight transport.

Yours faithfully,

D. ROBERTS, A.M.INST.T.

107, Grand Avenue, Hassocks, Sussex

[Study of the papers read to, and discussions held at, the Institute of Transport shows that there is no slavish adherence to the doctrine mentioned.—ED., R.G.]

Passenger Traffic in the U.S.A.

December 14

SIR,—In your December 11 issue an editorial article by a correspondent suggests that there may be a "turn in the ebbing tide of American passenger patronage." The A.A.R. statistics for nine months to September do not support this notion. Passenger revenue decreased by \$11.5 million, or 2 per cent, from 1958, when there was a decline of \$60 million, or 8 per cent, below 1957. Freight traffic alone keeps the U.S.A. railroads going; despite the steel strike, it produced in the first nine months of this year \$350 million more revenue, a rise of nearly 6 per cent.

On many American railroads passenger business is merely a side-line. The Pennsylvania, New York Central, and New Haven account for one third of the total passenger takings. At September 30 they had decreases of 1.5 per cent, 9 per cent and 8 per cent, respectively in passenger receipts, against increases of 8 per cent, 10 per cent and 1.5 per cent in freight receipts.

On the other railroads mentioned in the article passenger

revenue was less than one-tenth of freight revenue and the cost of providing passenger services would account in part for increases in operating expenses varying from 2.9 per cent on the Rio Grande to 8 per cent on the Burlington, 9 per cent on the Rock Island and 10 per cent on the Santa Fe. In contrast the Norfolk & Western Railway, working a scanty passenger traffic but originating about a tenth of the coal raised in the U.S.A., reduced operating expenses by 9.5 per cent and increased its earnings (before charges) by 35 per cent. The N. & W. operating ratio of 63 per cent compared with 79 per cent for the whole railroad system and with 85 per cent for the New Haven which had a deficit of \$6 million at the end of September.

The future of American railroading depends upon the development of freight business throughout the country and not on the spasmodic efforts of individual lines to check the decline of passenger traffic by adjusting their charges and general facilities.

Yours faithfully,

R. BELL

Clacton-on-Sea

Speed in Passenger Travel

January 1

SIR,—Mr. E. Decreus, in his letter in your issue of January 1, gives a false impression of cross-country travel in Switzerland. Through coaches are largely confined to the international trains, and many journeys entail two or more changes, but these are not inconvenient.

The essential features, which British Railways would do well to copy, are guaranteed connections, and a cheap, efficient, and reliable registered baggage service, so that one can change trains without hurrying and without being encumbered by baggage.

Yours faithfully,

JOHN RODGERS

132, Worrin Road, Shenfield, Essex

Centralised Traffic Control

December 31

SIR,—The first paragraph of the letter from Mr. D. H. Constable in your December 25 issue is irrelevant. I am mildly surprised to find that he has to enlist the aid of irony to reinforce his argument.

I am not a technician, but I was aware that the "entrance-exit" system of control was usually abbreviated to "N.X.", the phonetic abbreviation deriving from the name "ENTRANCE-EXIT." Having made a close study of signalling methods for many years, I acquainted myself with this system long ago, when Mr. Constable was still an Assistant Signal Inspector in the Swindon area. While I may not be similar to a "practical signal engineer," I have at least seen and operated this type of apparatus.

To return to C.T.C.: it is improbable that Mr. Constable and I will ever agree on what is, or is not, C.T.C. The term is loosely applied these days, and I consider that he has made the elementary error of confusing a system of control with a system of signalling. In the Sandbach-Wilmslow area of the London Midland Region, installations are in operation that are part O.C.S. route relay, and part remote control, and worked from the same panel; but that does not make it C.T.C. When any number of signalboxes are closed by the introduction of a power-operated panel, it can be said that the "control has been centralised," but it does not become C.T.C. in the accepted sense.

As long as the despatcher has only control of the locking and unlocking of points and sidings, it is centralised traffic control, but as soon as they are operated from the same panel by means of a coded circuit, then it becomes "remote control" and should not be called C.T.C.

Yours faithfully,

COLIN P. LOVEMORE

13, Elliston Road, Redland, Bristol, 6

THE SCRAP HEAP

Misogynist Monk

Kim, a nine-month-old monkey which ran up a 60-ft. elm tree recently after being frightened by the whistle of a train, was still at large several days later. He had been tempted by bananas, sprayed with a fire hose, and a female monkey was also brought to the scene, but without success.—From "The Guardian."

Czech-built Locomotives in Asia

Referring to the photograph in our October 23 issue, of a 0-10-0 locomotive of the Persian State Railways built by Breitfeld Danek before and during the first world war, in what is now Czechoslovakia, a correspondent states that these locomotives, when he has heard them at work in Austria and Yugoslavia, have had a very loud exhaust beat. Another example of Czech locomotive building is seen in the photograph he has sent us of a 2-10-0 built in 1949, at the head of the "Taurus Express" on the Turkish State Railways.

Scepticism

Morning after morning suburban trains arrive at Kings Cross to be greeted by a loudspeaker announcement. "We regret the delay in arrival of this train due to . . ." As we are all so fed up with having to tell the same story to our employers, could not printed slips be given at the station to delayed passengers as proof?—From a letter to the "Evening Standard."

It's Better by Rail

The two posters reproduced on this page have been issued by the Department of the Public Relations & Publicity Officer, British Railways, North Eastern Region, to emphasise the reliability and comfort of travel by train in winter weather, and the advantages of travel by



Photo]

[A. E. Durrant

"Taurus Express," Turkish State Railways, headed by 2-10-0 locomotive built in Czechoslovakia in 1949

train notwithstanding the construction of the M1 motorway between London and Birmingham.

Linking the Americas

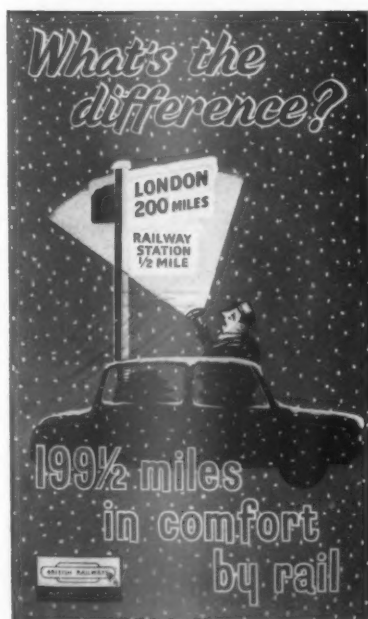
A great event has just occurred in Canada. The Victoria-bridge, the greatest work of Robert Stephenson, has been opened for traffic. We believe that seven years and upwards have been consumed in this construction of this wonderful bridge, and at last a train has passed over it, and the St. Lawrence is no longer an obstacle to free communication between the Canadas and the United States. This bridge is the most magnificent work of the kind in existence; for although within our own island we have the bridge across the Menai Straits, yet in every point the Victoria-bridge is far superior. The St. Lawrence . . . with the great chain of lakes, actually divides North America in two. . . . There is, indeed, an admirably planned wooden bridge at Niagara, but it is not to be mentioned as a rival of the stupendous achievement at Montreal. The provinces of the North American Union are now so intimately con-

nected by iron lines that all that was wanting to bring the Union into close communication with Canada was to span the St. Lawrence, and this has now been done.—From "The Times" of January 5, 1860.

[Reference to this bridge was made in an editorial article on page 4 of our January 1 issue.—ED. R.G.]

Rail Travel in the U.S.A.

In Washington itself some of the great trains to the South (which used to be full of drawing-rooms conveying James Bond, a honey blonde and two pounds of caviare to Florida) are now reduced to lumbering out over the Potomac bridge half made up of passenger coaches and half made up of freight trucks. Apart from the commuting lines (although even here there is little attempt to develop services to meet the needs of new urban areas), American railroads in the East are already deep in a sloth of disuse. By comparison, British railways stand out as a shining example of thrustful modernity.—Roy Jenkins, M.P., in "The Spectator."



Two posters produced by British Railways, North Eastern Region

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

NYASALAND

New Goods Depot at Blantyre

A new goods shed and offices situated on the site of the former Blantyre Passenger Station was opened on December 10, 1959. It will handle the traffic to and from Blantyre. The shed is 365 ft. long and 40 ft. wide, and is built of tubular steel framework, with brick side and end panels and an asbestos cement roof. The concrete floor provides 14,600 sq. ft. of uninterrupted space. On each side of the shed is a 10 ft. wide covered loading platform, which run the full length of the building, one platform being served by rail and the other by road. There are four large doorways in each side. The road service area is 65 ft. wide, sufficient to allow parking and easy manoeuvrability of lorries.

At the east end of the shed is a reinforced concrete framed building, faced with terrazzo, which provides office accommodation on two floors for Railway and Customs staff. The whole area is designed for simplicity of handling of goods traffic, and transhipment of consignments will be considerably speeded up. This is the second stage of the development of Blantyre Station. The new passenger station was opened in September, 1958. Additional land has been acquired to provide for the anticipated development of the Blantyre traffic for many years to come.

INDIA

Record Achievements at Moghalsarai

During the month of September, 1959, the movement of wagons through Moghalsarai marshalling yard, Eastern and Northern Railways, averaged 5,111 wagons daily as compared with the highest previous number of 4,855 in April, 1959. Clearance for the N.R. averaged 2,569 wagons against 2,454 in April.

Sleeping Cars on the N.E. Railway

Sleeping cars, previously running on express trains between Gorakhpur and Lucknow, were transferred to passenger trains this month in response to public demands. The General Manager of the N.E. Railway, Mr. S. S. Ramasubban explained that the action had been taken on the suggestions made at the first meeting of the Parliamentary Informal Consultative Committee held early last year on subjects like provision of more amenities at stations and in trains, more halts for the convenience of travelling public, setting up of more enquiry and booking offices and greater supervision over catering arrangements.

Main Line Developments

Work on the first 20 miles or so of the Baraset-Hasanabad line, in West Bengal, has begun and on the remainder of this section it is expected to commence shortly. The Eastern Railway has acquired possession of the entire land

needed for construction of this line. Work in connection with the electrification of the Sealdah Division has been sanctioned and, in the first instance, will cover the portions from Sealdah to Ranaghat and from Dum Dum to Bongaon. The alignment for restoration of the Bandel-Barharwa section between Nimita and Tildanga has been finally located and plans have been submitted to the State Government.

PAKISTAN

Development Loan

The United States Development Loan Fund has approved a \$22,000,000 loan for the rehabilitation and development of Pakistan Railways. An application for the loan was submitted by Pakistan Railways last August. The money will be used for development of the Bholaganj-Chhatak Ropeway, Dacca re-alignment, Karachi Circular Railway, and the purchase of locomotives, rolling stock, materials for track and bridges, and other equipment for the North-Western Railway and the Eastern Bengal Railway.

WESTERN AUSTRALIA

Motorcar Transporter Wagon

A new railway wagon, specially designed for the carriage of cars and car bodies from Kalgoorlie to the Perth metropolitan area, has been placed in service. The wagon was converted in the Midland Junction Workshops from an obsolete passenger coach. It is the longest railway wagon in the State and measures 70 ft. long, 7 ft. 11 in. wide and weighs 13 tons 12 cwt. An average of more than 1,100 cars and bodies is railed each month from the Eastern States to the metropolitan area. The new wagon will help carry this traffic most efficiently and with a considerable saving in tare haulage. As soon as the

wagon has completed a trial period to determine any necessary improvements, more of this type will be built. The wagon may be loaded with five small or four large complete cars on the deck with six car bodies on its top tier or alternatively with six bodies on deck and six bodies above. It is equipped with passenger bogies and in consequence can be attached to trains running at passenger speed.

CHINA

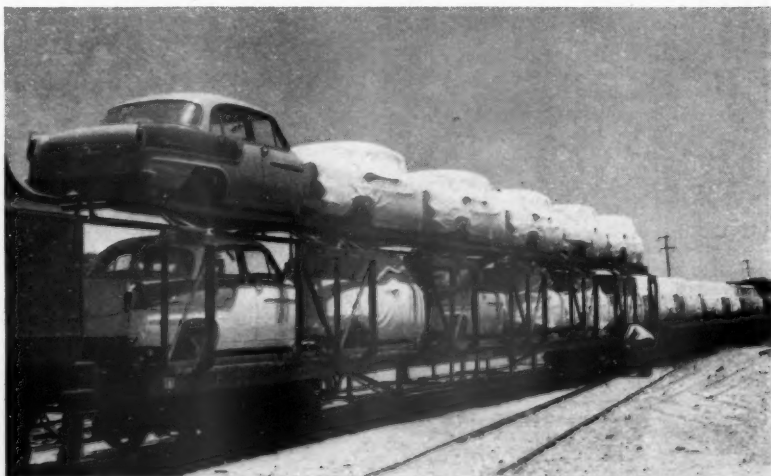
Trunk Line Construction

More than half of the 1,420-mile railway across north-west China to the Soviet border has been completed. The first train from Hami, in the east of Sinkiang province, which lies between Tibet to the south and Mongolia to the north-east, left east-bound for Lanchow in neighbouring Kansu on December 31. On the previous day the track, which crosses the Gobi Desert for about 180 miles, was laid into Hami, an expanding industrial town. Much of the railway, which will run to the Kazakh region in the south-east of the Soviet Union, follows the old silk road. Work is to be stepped up on the remaining stretch of about 620 miles from Hami to the Soviet border.

BRAZIL

Rio Grande do Sul Modernisation

The Rede Ferroviaria Federal has announced that approximately 1,000 million crs. will be spent to modernise the Rio Grande do Sul Railway; 186 miles of rails are being renewed, 35 diesel-electric locomotives and 30 passenger coaches are scheduled for delivery in June, and a presidential decree has authorised the expropriation of the necessary properties to permit construction of the Cai-Passo fundo line, realignment of the Ramiz Galvao-Barreto



Two-tier transporter wagon loaded with six motorcar bodies

section, and extension of E.F. Jacui to the Sao Jeronimo coal mines. A credit of 182 million cruzeiros has been approved to cover the 1959 deficit.

Suburban Electrification

The Rede Ferroviaria Federal has authorised an expenditure of 2,000,000 crs. for the electrification of the Leopoldina Railway suburban lines at Rio. A preliminary credit of 600,000,000 crs. has been opened for building the sub-station at Triagen, laying of 5-ft. 3-in. gauge tracks throughout adaptation of, stations, and so on, preparatory to the unification of the Central Brazil and Leopoldina suburban services.

UNITED STATES

"Piggyback" Transport Developments

The exceptional clearances required by flat wagons loaded with covered road lorries of the type used in "piggyback" transport has made it necessary for the Pennsylvania Railroad to reduce its double line through certain tunnels in the Baltimore area to gauntleted track, to give the loads the maximum clearance to the crown of the arch. For the same reason the Canadian Pacific Railway has singled its double track through the five-mile Connaught Tunnel, through the Selkirk Mountains on the main line to Vancouver.

An interesting development on the Chesapeake & Ohio Railroad is that by agreement with four operating unions the railway is being allowed to move up

to 10 "piggyback" flats, loaded with up to 20 road trailers on passenger trains without having to pay the train crews mixed or freight train rates. The first C. & O. service of this kind is being operated between Staunton, Virginia, and Charleston, West Virginia.

SWITZERLAND

Type "Ae 6/6" Locomotives

Out of the total of 50 Swiss Federal Railways 6,000 h.p. "Ae 6/6" locomotives that have been on order, 44 have now been delivered. As the result of experience, the periods between tyre turning and examination of brakes has been extended to 250,000 miles; between overhauls of traction motors and auxiliaries to 745,000 miles; and between general overhauls to 1,550,000 miles. The figure last-mentioned has already been attained by the two first locomotives of this type, which entered service in 1949. The maximum load permitted to be hauled by "Ae 6/6" locomotives up the continuous 1 in 38.40 gradients of the Gotthard route has now been increased to 620 tons.

Improving Access to Interlaken

To relieve the pressure on the 10 miles of single track between Spiez and Interlaken, the Lötschberg Railway is to lay in a new crossing loop, 1,460 ft. long, between Faulensee and Leissigen. It is possible to cross trains at both these points and also at Därligen, and the

4.1 miles between Faulensee and Leissigen is the longest remaining stretch without this facility. The site of an old cantonal road will be used in part as the formation for the second track. The work is planned for completion by the end of this year, and will cost about Sw. fr. 800,000.

The Jungfrau Railway Group

The decision has been reached to change the electric current used on the Jungfrau Railway from 40 cycle to 50 cycle. A new transformer station will be built at Eigergletscher to reduce the potential of the current supply from 16,000 to 7,500 V., at a cost of Sw. fr. 180,000. It will be necessary to modify all the train equipment, and, because of the growth of the traffic, it is intended to marshal the existing stock into trains of higher capacity. These will be supplemented, in the autumn of this year, by four new motor trains of greater power and seating capacity than any used hitherto. The total cost of the transformation is estimated at Sw. fr. 4,000,000.

The Wengernalp Railway, which brings passengers for the Jungfrau Railway up to the Kleine Scheidegg, also has two new motor coaches on order for delivery before next winter. The latter company's protection work above Alpglen against avalanches descending from the Eiger has been extended during 1959 from the original 390 ft. to 1,420 ft. in length, and will be completed during 1960 by a further 295 ft., extending the whole to roughly a mile of avalanche tunnel.

Publications Received

Far Wheels. A Railroad Safari. By C. S. Small. London: Cleaver-Hume Press Limited, 31, Wrights Lane, W.8. 9½ in. x 5½ in. 166 pp. Illustrated. Price 25s.—These reminiscences of travel over railways in East and Central Africa, Madagascar, Fiji, Jamaica, Peru, and Japan afford some interesting sidelights on operating methods and motive power, besides much entertainment. The author, an American, an official of an oil company, and resident in Japan, writes in a clear, attractive style. His considerable powers of observation as regards railway motive power and equipment have not prevented some mis-spellings, such as "Garret" for Garratt. Much of what he describes, such as steam locomotives now replaced by diesels, must have disappeared even by now. Some of his digressions into the historical backgrounds of railways include sweeping statements. Nor would most people acquainted with East African Railways & Harbours consider that system conservative in its methods. The appendix giving lists of locomotives and railcars testifies to the workmanship and enterprise of British, Continental and American builders.

Seel Sprayed Asbestos.—A leaflet has been issued to describe the products of Chancery Industries Limited which recently became a member of the Universal

Asbestos Manufacturing Co. Ltd. This sets out in concise form the six main functions of Seel which are thermal insulation, fire protection, anti-condensation, anti-corrosion, sound absorption, and dust exclusion. An application for any of these purposes automatically provides the advantages of the others. Figures are given for thermal conductivity, weight, fire gradings when applied to steelwork, and sound absorption. Examples are included for thermal efficiency of some typical industrial roofs unlined and lined with Seel. Various uses quoted include service ducts and trunking in buildings, and applications to machinery, ships, road vehicles, and railway rolling stock. Copies are obtainable from the U.A.M. Group Advisory Service, Tolpits, Watford, Herts.

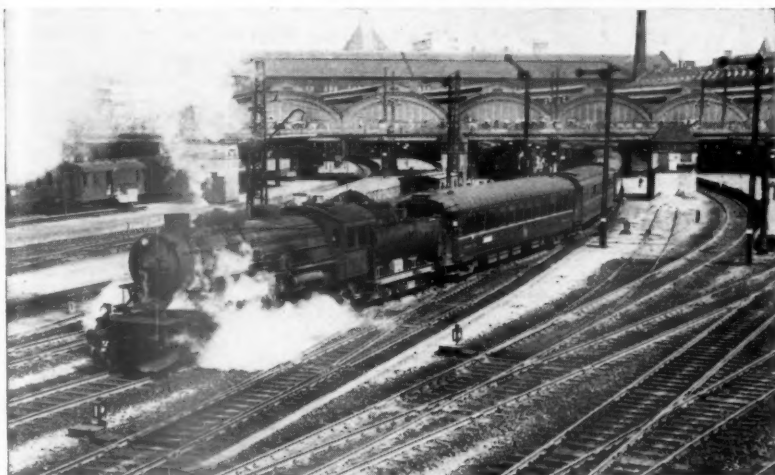
The Ward Group of Companies, Products and Services.—This 68-page book with many illustrations in colour is a useful guide to the facilities offered by Thos. W. Ward Limited and associated companies. It includes a map showing the location of offices, works, and other installations of the group and its associates throughout Great Britain with a colour key to indicate the services offered at each branch. Sections of the book deal with contractors' plant, cranes, machinery including machine tools, railway plant including shunting locomotives and wagon construction and repair, industrial plant, road and

building materials, iron and steel, and scrap metals. The railway section illustrates examples of small sidings and large complicated layouts constructed by the specialised consultation and contracting department. Relayab's second-hand or slightly-defective new rails of all normal sections can be used to effect considerable savings in prime cost. Also individual switches and crossings are shown under construction and after completion of laying at site, some with integrated road-rail systems. Copies may be obtained from Thos. W. Ward Limited, Albion Works, Saville Street, Sheffield.

Bakelite Phenolic Resin Foams.—An advance information sheet has been issued by Bakelite Limited to give details of a low-density cellular material recently developed for use in thermal insulation and as a light-weight core material for building panels. Information is also given on the special machines which have been developed for rapid mixing and dispensing of the foams. Bakelite Limited supply the phenolic resin, foaming agent, and hardener, which can be mixed and then poured into a mould for making into large blocks for cutting into slabs; alternatively, the mix can be poured into cavities for foaming *in situ*. The complete mixing and foaming process takes less than 10 minutes and the foams do not support combustion. Copies may be obtained from Bakelite Limited, 12-18 Grosvenor Gardens, London, S.W.1.

Danish State Railways Modernisation

*Introduction of diesel traction: C.T.C.
installations: expansion of train ferry facilities
(By a correspondent)*



Westbound express leaving Copenhagen Central, hauled by Class "E" 4-6-2 locomotive. The leading vehicle is a sleeping car of the Wagons-Lits Company

THE railways of Denmark consist of the State Railways, with some 1,570 miles of line, including all the main routes, and about 40 private railways, totalling 1,100 miles, of local importance. Of the State Railways some 440 miles are double track, with 12 miles of quadruple track in the Copenhagen area.

The table below indicates the scope of the State Railways activities in the year ended March 31, 1958:

Passenger journeys	...	110,950,000
Motorcars carried on ferries	...	1,200,000
Goods tonnage conveyed	...	6,400,000
	Krone (millions)	
Passenger receipts	...	262.8
Receipts from motorcars on ferries, etc.	...	25.7
Goods traffic receipts	...	176.1
Other receipts	...	63.3
Total Receipts	...	527.9
Working expenses	...	556.0
Depreciation	...	21.7
Interest on loans, etc.	...	46.3

The country is divided by channels and arms of the sea and there are few hills. Competition from road and sea transport is acute. As neither coal nor minerals are found in Denmark there is very little carriage of these by rail.

Modernisation Programme

Concomitantly with the introduction of diesel traction, the State Railways have embarked on a comprehensive modernisation programme. It is realised that much traffic over short distances is better handled by buses and lorries. The traffic facilities at many wayside stations are being reduced, and some stations closed to all traffic.

To enable goods trains up to 2,740 ft. long to be run, loops are being extended to 3,000 ft. on double, and to 3,500 ft. on single lines. This makes it possible to admit trains simultaneously to a crossing station on a single line. On double-track sections the number of stations equipped with loops is being reduced, and these are better spaced.

Points at country stations are being electrically heated to avoid trouble during the winter from snow.

The State Railways system is equipped with automatic block throughout, in most cases also for left-hand running where necessary. Right-hand running is usual. Wayside stations will be remote controlled by C.T.C. system, largely with a view to staff economies. Work on installing the necessary equipment is in hand on the Copenhagen-Korsør, Nyborg - Fredericia, Lunderskov - Padborg, and Vordingborg-Gedser and Rødby lines.

On the Nyborg-Fredericia line, re-signalling from Nyborg to Tommerup is completed. The line is controlled by one man from a central box at Odense. The stations are equipped with all-relay

interlocking apparatus, so that normally the station staff has no duties in connection with signals, barriers and so on. If the automatic control fails, the local staff may in case of emergency switch in apparatus and take over control. Equipment for signals, switches, telephone, and C.T.C. is fitted in a cabin in the State Railways workshops. The complete cabin with contents is sent to the station and erected there. Passengers must cross the tracks at many stations. The crossing places are equipped with automatically-controlled warning signs and loudspeakers.

In the C.T.C. control rooms the positions of all trains are plotted on graphic time sheets. It is possible to transit all messages on one pair of cable cores. Other lines are being similarly equipped.

On a few junctions new switches are being laid with an inclination of 1:18.5 allowing trains to pass at 62 m.p.h., and with suitable curvature, at 75 m.p.h. on both tracks.

New Construction

The only new line being built, apart from suburban lines, is that from Nykøbing to Rødby, some 23 miles, for international traffic with Germany and beyond. From Rødby harbour there will be a train ferry to Puttgarden in Germany, whence a new railway line is being built to connect in Grossenbrode with the present German Federal Railway line. The new ferry route is expected to be ready in 1962-63. The sea crossing will only be 12 miles long and take about 50 min., which compares with 2½ to 3 hr. by the present Gedser-Grossenbrode ferry.

The many bridges on the State Railways include the Little Belt Bridge between Funen and Jutland. It is some 3,900 ft. long, carries two tracks, a road-



Train on Storstrøm Bridge, hauled by Class "MY" diesel-electric locomotive

way, and a footpath. The height above water is 108 ft. The roadway is now too narrow, so that a further road bridge must be built within some 10 years. The longest bridge in Europe is the Storstrøm Bridge, between Zealand and Falster, is 10,500 ft. long, carries one track, a roadway and a cycle path. The height above water is 85 ft.

Track

The maximum permissible speed is 75 m.p.h. and the maximum axle load 20 tonnes. On the running lines the standard weight of the flat-bottom rails is 72 and 120 lb. per yd. On secondary lines 72-lb. rails are used with soleplates on deal sleepers. On the main lines 90-lb. and 120-lb. rails rest directly, without soleplates on the sleepers, which are of beechwood. All sleepers are impregnated with tar oil. The 120-lb. rail introduced since 1939 is now gradually being laid on principal main lines,

of the lines the track maintenance is carried by *soufflage mesuré*. This method is being used increasingly.

Diesel motive power was introduced in 1927, and in 1935, the three- and four-car diesel electric train sets, *Lyntog*, were introduced. In the same year the "MO" class diesel-electric railcars were introduced, of which type there is now 139 in service. After tests with some prototypes of diesel locomotives the introduction of this type of power started in 1954, and there are now 45 diesel locomotives in service.

Replacement of Steam Power

In 1953-54, steam locomotives accounted for 45 per cent of the train mileage, electric traction for 10.7 per cent and diesel for the remainder. In 1958-59 only 13.6 of the train mileage was steam worked, 23.3 per cent worked by diesel locomotives and 46.8 per cent by diesel railcars. The number of steam

diesel engines of the same type as the engines in the "MO" cars. The maximum speed is 75 m.p.h.

These trains provide fast services between Copenhagen and the main provincial towns in Jutland. At the Korsør-Nyborg ferry terminals they run straight on board the ferryboats and after the crossing start direct from the ferry. Their introduction facilitated a cut in the timing between Copenhagen and Aarhus from 7½ to 4½ hr. These trains also were built by Frichs.

The first diesel locomotives of the "MY" class were delivered in 1954. They have replaced a large number of steam locomotives, hauling both express passenger and heavy goods trains. The locomotives have two three-axle bogies and weigh 102 tonnes. The h.p. is 1,750 (1,950 for the newer locomotives). The maximum possible speed is 83 m.p.h.

For delivery during the next three years the State Railways have ordered



Class "MY" 1,950-h.p. diesel-electric locomotive built by Nohab on licence from General Motors

replacing the 90-lb. rails, which are then used on secondary lines.

New rails delivered from factory are 50 ft. long. At the State Railways welding plant at Fredericia they are resistance-welded into 100-ft. lengths. The 120-lb. rails are welded into 197-ft. lengths. On existing tracks the rails are thermit-welded *in situ*.

Recently the State Railways have introduced long-welded rails on concrete sleepers. This is only the case with the 120-lb. rails. The sleepers are of the French standard "RS" type and manufactured in a new factory, which produces 40,000 a year.

Trackwork has been mechanised to a large extent. Tamping machines of Scheuchzer and Plasser & Theurer manufacture are used, also Jackson tampers, which are considered more suitable for points and on heavily trafficked lines where heavy machines cannot be used. The track is tested twice a year by a Mauzin track recording car. On many

locomotives has in the past five years fallen from 378 to 166, and is still rapidly diminishing.

Most of the lighter passenger trains are today hauled by diesel-electric railcars of the "MO" class, which can haul three bogie trailers. Sometimes these railcars are coupled two together as multiple-unit, hauling up to six trailers. The "MO" car has two diesel engines of 250 h.p. each, placed on one of the bogies, while the traction motors are nose-suspended on the other bogie. The maximum speed is 75 m.p.h., and the weight 58-65 tonnes. The oldest cars of this type have hot water heating, the later cars have automatic oil-fired boilers for train heating. All these railcars are built by Frichs of Aarhus, and have proved very reliable.

The *Lyntog*, introduced in 1935, have given excellent service. There are three diesel-electric three-car sets, carried on four bogies, and five four-car sets, on five bogies. Each set has four 250-h.p.

45 diesel-electric locomotives, "MX" class, of 1,425 h.p., intended for secondary lines. They have two three-axle bogies each and resemble the above-mentioned "MY" class delivered by Nohab, Sweden, on licence from General Motors, while part of the locomotives were constructed by Frichs and electrical equipment by other Danish firms. Both classes can work passenger and goods traffic, and can run in multiple. They all have an automatic oil-fired boiler for train heating. It is expected that in 1963 steam engines will only be used during the summer holiday traffic and other peak traffic periods.

The shunting engine stock consists of 71 diesel-mechanical shunters for light work, while there is still 170 steam shunting engines. These will, however, be replaced shortly by diesel shunters, as the State Railways have ordered from Frichs 80 diesel-hydraulic locomotives of the "MH" class, of 440 h.p., of which type three locomotive engines

have been thoroughly tried during the last years. Also 15 diesel-electric locomotives, Class "MT," are on order, while two of this type were acquired in 1958. They are of 425 h.p. and are intended for shunting as well as for hauling light trains.

Maintenance of diesel locomotives is planned, so that the different parts are inspected after a certain mileage. To this end two diesel depots have been built, one in Copenhagen and one in Aarhus. There are inspection pits and side platforms at two levels. Only when the body must be lifted is the locomotive brought to the main workshop.

Carriages and Wagons

For normal passenger traffic all stock is bogie. Since 1932, only steel bodies have been used, of all-welded construction. For long-distance traffic, coaches are side-corridor type, and suburban services are worked by centre-corridor stock.

Second class coaches now being delivered and intended for night travel are highly insulated against noise and heat. They have adjustable seats with reclining backs. When the fluorescent lamps are switched off, there is a reading lamp at each seat. There are also plugs for electric shavers.

Since 1954 all open and covered goods wagons have been built to standard designs prepared by O.R.E. (Office for Research & Experiments at Utrecht).

All the carriages and wagons mentioned were built by Scandia, of Randers.

Ferry Routes

The most important of the Danish State Railways ferry routes is between Korsør on Zealand and Nyborg on Funen, 16 miles. It is a very important link in the internal traffic, and the route also has great importance for traffic between Sweden, Norway and Finland and Germany and beyond. The route is now worked by seven railway ferries and one motorcar ferry, averaging about



Bus Station at Odense. Most of the buses belong to the State Railways. In background (right) new office block of goods station

31 round trips a day. The train ferries are diesel vessels with three tracks.

After the war the number of motorcars taken over has risen enormously. Consequently it was decided to open a special car ferry route between Halskov (near Korsør) and Knudshoved (near Nyborg), where the distance is only 12 miles, so that a ferry here is able to make six round trips in a day compared with five on the Korsør-Nyborg route. The new route was opened in June, 1957. The newest ferry boat, *Prinsesse Benedikte*, has railway tracks on the deck, so that it may be used as car ferry in the holiday season, and as railway ferry between Korsør and Nyborg at periods. The two other internal train ferry routes, between Faaborg and Mømmark and between Glyngøre and Nykøbing M., are only of small importance.

In conjunction with the Swedish State Railways the Danish State Railways work two railway ferry services. The route between Elsinore and Helsingborg

is only three miles long and is worked by five Danish vessels, while the 20-mile route between Copenhagen and Malmö is worked by one Swedish ferryboat.

In co-operation with the German State Railway (Eastern Germany) the 30-mile train ferry route is operated between Gedser and Warnemünde. This route was of considerable importance before the last war, but is now (going to the Eastern zone) practically of importance only for goods traffic. It is worked by one Danish vessel.

A new ferry route to Western Germany was opened in 1951 between Gedser and Grossenbrode, 44 miles. This route has taken much of the international traffic formerly routed via Korsør-Nyborg route. The crossing is worked by two Danish and two German railway and car ferries.

Road Transport Undertakings

The Danish State Railways run both bus and lorry services. In 1932 the State Railways took over a few private bus routes, and since then many other bus routes have been acquired and some new routes inaugurated. It was the intention to take over routes parallel with the railways, or between provincial towns served by the railways. There was no intention to take over feeder undertakings. In several cases the State Railways now run buses in areas formerly served by private railways, of which many have been closed.

Among the routes are also some express routes, connecting certain provincial towns, which have no convenient train connection. In the Copenhagen area the State Railways own some suburban bus services. The State Railways also participate in the Europa international road passenger services. They now operate 139 bus routes, only a small part of the total number in the country, though railway-owned routes are among those with the heaviest traffic. They own 530 buses, nearly all diesel.

With the growing number of private and State-owned bus routes it has been necessary to build bus stations. In many

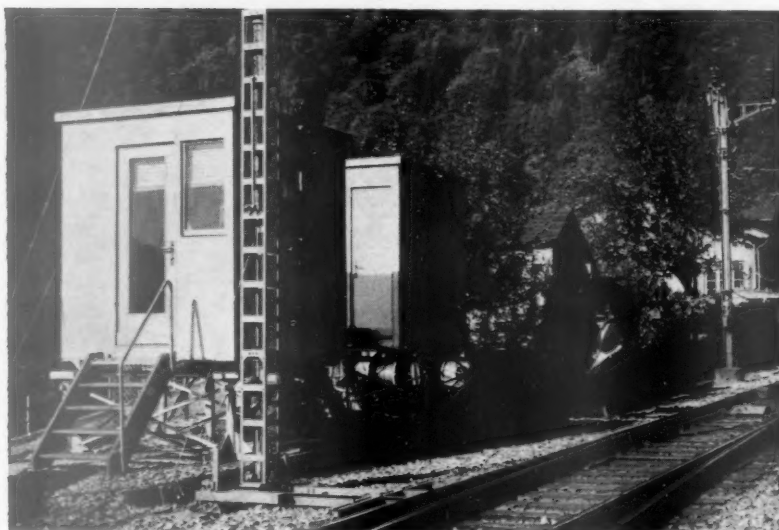


The Storstrøm Bridge, 10,500 ft. long, on the Copenhagen-Gedser main line. The bridge carries a single line, 18 ft. roadway and cycle path

(Continued on page 76)

Transportable Signalbox on Swiss Federal Railways

Temporary points with relevant signals and transportable signalbox facilitate single-line operation during engineering work



Signalbox and relay room in position on special frame supports alongside track

TO effect engineering work with the least possible interference with traffic always has presented problems, especially when trains cannot conveniently be

diverted over alternative routes. Single-line working can of course always be resorted to, but special equipment is essential if delays are to be kept to a

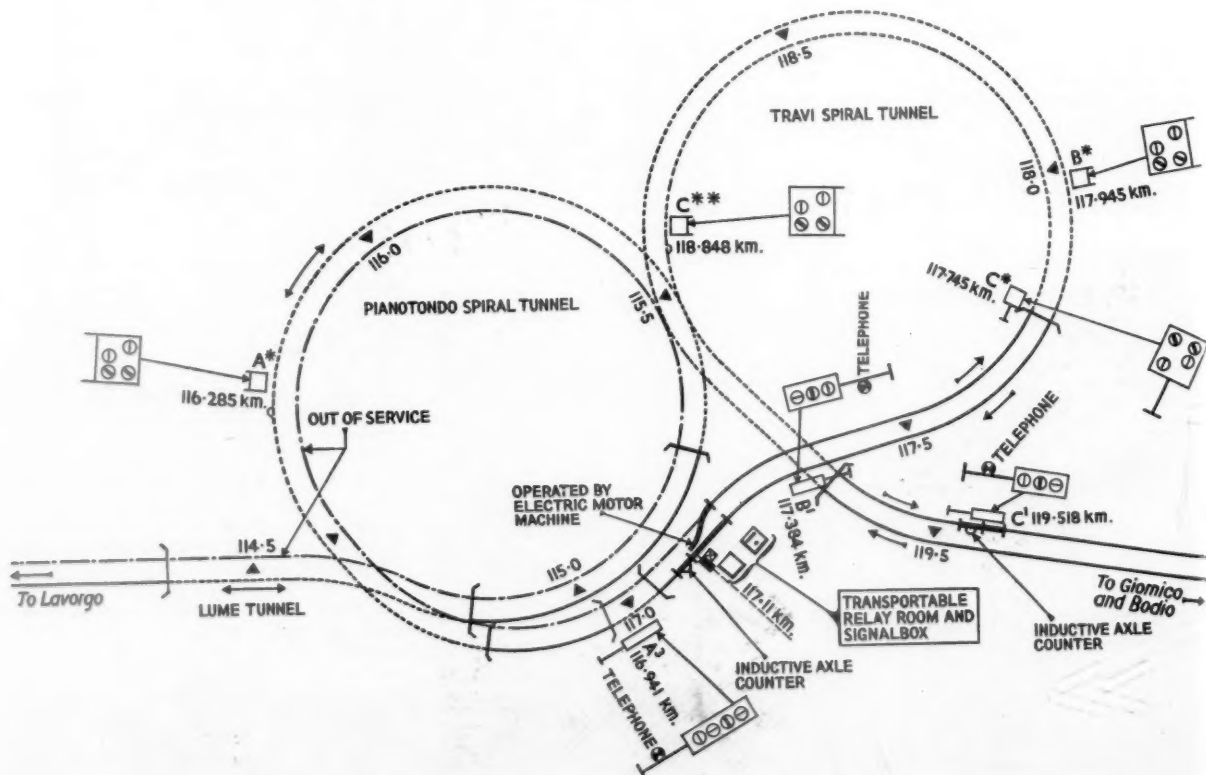
minimum. An example is the transportable signalbox and associated equipment used by the Swiss Federal Railways and shown in the accompanying illustrations, which refer to an application in 1958 on the Gotthard line.

This line carries more than one-third of the goods and about one-fifth of the passenger traffic of the whole S.F.R. system. Train intervals are very short and afford no opportunity of carrying out permanent way, bridge, or overhead wire maintenance or renewals without considerable disturbance to traffic, especially where station distances are appreciable, as between Giubiasco and Rivera-Bironico, about 7 miles, and Lavorgo and Bodio, 8 miles.

Halving the Section

The Engineering Department, in consultation with the traffic officers, therefore proposed installation of an intermediate set of points about midway in the section, on the principle adopted in 1947 for the 9-mile Gotthard Tunnel itself, as described in *The Railway Gazette* of February 6, 1948. In the latter case, however, permanent double crossovers were provided, remotely controlled from Göschenen Station.

Such points would enable half the



Layout between Pianotondo and Travi Tunnels on Gotthard line, controlled by transportable signalbox



Signalbox unit being conveyed to train by lifting truck

section to be worked as a single line, liberating one track completely for the engineers; the other half would remain double as before. With a little rearrangement of the timetable the bottleneck so created could be tolerated, provided full signalling was maintained, including the interlocking block.

The location of the points would need to be carefully determined from both the operating and topographical points of view. In mountainous country they would almost certainly have to be on a gradient, and so increase the difficulty of starting a train stopped by signal, and especially if there were curves at or near the points. When the single line is on the up gradient side, such stops can hardly be avoided; but they can be rendered less frequent in proportion to the rapidity with which descending trains can vacate the section.

To facilitate this, a starting signal is provided, controlled from the temporary signalbox at the points and located at least 900 yd. beyond the end of the single-line section. A train can thus draw forward to the intermediate signal before the preceding one has cleared the ordinary block section in advance. Axle-counting is used to prove this supplementary section unoccupied before another train is allowed to enter it.

Temporary Equipment

The diagram shows the layout adopted in the case of the temporary signalbox installed between the Pianotondo and Travi spiral tunnels, on the southern approach to the Gotthard Tunnel, to free one track between this point and Lavorgo Station for engineering work. The home signals, A and B, near the points give the standard indications adopted by the Swiss Federal Railways for the movements involved and are provided with distant signals, as is also the starting signal C on the double line. As this distant signal is located in the Travi Tunnel it is repeated by an outer distant at the northern portal. Telephones are provided at the stop signals. The points are operated by an electric motor machine and are of large radius to permit

a speed of 37 m.p.h. on the diverging route. Temporary alterations at Lavorgo Station are necessary to allow of movements being made to and from the single line under full signal protection.

Three other variations of this arrangement are possible, according to which particular section—to the left or right—has to be rendered temporarily single and which of its two tracks must be put out of use. The apparatus, therefore, was specially designed by the suppliers, Integra A.G., of Wallisellen, Zurich, to be readily adapted to any of the four possible layouts.

The signalbox has a "domino" type push-button panel and a simple rearrangement of the components and cover plates, quickly effected, enables it to suit the particular layout required in each case. As the interlocking block must necessarily be able to work with whatever types of signalbox happen to be in use at the adjoining stations, a.c. apparatus, operated by magneto hand generator, is provided, as this is readily combined with other forms of equip-

ment. There are communication with the main telephone circuits and means of operating the station-to-station signal gongs, distinctive of train operation in Switzerland. Power is taken normally from the 163-cycles traction supply, with facility for automatic changeover in case of failure to the public supply, where such exists.

Constructional Features

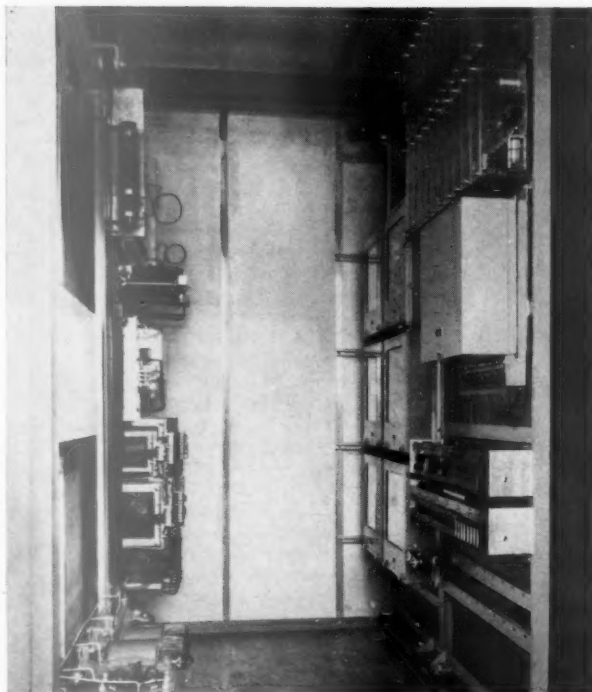
Little time is usually available for installing the temporary points, modifying the overhead wiring, placing the signalbox and relay room in position, and connecting up to the outdoor equipment. Special attention therefore was given to the design of every item. To keep size and weight within acceptable limits the signalbox proper and relay and transformer room were made as similar units of plywood, faced with thin aluminium sheeting, on welded tubular steel frames. Each weighs in working order about 1½ tonnes. Rollers enable them to move easily in runways, and they are carried to site on a drop-girder transporter wagon, from which they can be transferred to special supports, also fitted with runways, placed in readiness alongside the line. It is also possible to move the units by lifting trucks. When they are in position, connection between them and the lineside equipment is effected over multi-core corrosion proof cabling with thermo-plastic insulation and plug connectors. The 20-core cables between the two rooms are similarly fitted. The cables are conveyed on drums in varying standard lengths and readily laid beside the line; no jointing or soldering is required. No trenches are used; the cables are suspended on messenger wires or laid on brackets where there is risk of damage from defective brake shoes or other items.

Practical Results

When this equipment was first used in 1958 at Pianotondo it was found that, with the points already laid in the north-bound line and the two buildings put in



Relay room and signalbox on way to site on drop-girder wagon



Interior view of the transportable relay room



Signalbox, showing magneto type interlocking block

position, the changover to single-line working could be completed in $2\frac{1}{2}$ hr. without disturbing the traffic on that line. About $1\frac{1}{2}$ -mile length of track was then completely renewed in under five weeks and double line working once more resumed.

The dense traffic over the Gotthard route, with corresponding wear and tear on the permanent way, renders it advis-

able to divide the long distances between some stations into two or more block sections, with permanent crossovers at each signal location, but even were the funds immediately available a long time would be needed to carry this out.

Meanwhile, the transportable equipment will continue to be used regularly between Arth-Goldau and Lugano. In 1959 it was applied between Gurtellen

and Wassen. To keep installation and storage costs to a minimum the outdoor apparatus, weighing in all some 10 tonnes, is kept in a wagon, which can thus serve both to house it and transport it to site, as required.

We are indebted to Mr. R. Leemann, Signal Engineer, Second Division, Swiss Federal Railways, Lucerne, for the information on which this article is based.

Danish State Railways Modernisation (Concluded from page 73)

towns these adjoin the railway station. Often the State Railways provide the site and give bus passengers access to facilities in the railway station.

The road haulage and road delivery activities of the State Railways are considerable. One reason for developing delivery services was the cost of moving less-than-wagon-load traffic. Consignments are taken from the towns in the morning, and in the afternoon the lorries collect goods from senders directly and from the country stations. During the night consignments are forwarded by goods trains.

Copenhagen Suburban Services

Great Copenhagen has today a population of 1.3 million, of which 450,000 live in the suburbs. The population of the metropolitan area is expected to be 1.7 million in 1980-90. The inner suburbs are served by the State Railways electrified lines. Electrification started in 1934, and at present there are four lines: "A" Klampenborg-Copenhagen Central-Vanløse; "B" Holte-Copenhagen Central-Glostrup; "C" Ballerup-Copenhagen

Central-Hellerup; and "F" Frederiksberg-Vanløse-Hellerup.

The system totals some 37 route-miles. All four lines have a 20-min. service all day. The inner part of the suburban system, from Hellerup to Valby, of which the section Østerport-Vesterport partly is in tunnel, is served by routes "A," "B" and "C," and is served by nine trains an hour.

The number of passengers on the electrified lines is some 62 million a year. Of the four stations in the city, Copenhagen Central, Vesterport, Nørreport and Østerport, Nørreport handle the heaviest traffic, amounting to 40,000 passengers a day with peaks at 8-9 a.m. and 4-6 p.m. On routes "A," "B," and "C" eight-car trains are run in rush hours, while route "F" can only take six-car sets. There are no level crossings. Most of the stations have island platforms 2 ft. 10 in. above rail level. Signalling on most of the lines is automatic block and the remaining stretches are now being equipped. It will then be possible to run trains at $2\frac{1}{2}$ -min. intervals.

The a.c. current from the grid is transformed to 1,650 V. d.c. There are eight sub-stations, all remote-controlled

from that in Enghave. The present lines have overhead current collection. The traction voltage is 1,500 V. The rolling stock is of standard profile, seating five across the car. Half the vehicles are motor cars. There are two or three vestibules with hydraulically-controlled sliding doors.

With the rapid increase in the population of Greater Copenhagen plans have been worked out for the extension of the electrified suburban railway network.

The outer suburbs are served by diesel and steam trains. There are in rush hours, half-hourly services to Elsinore, Rungsted, Hillerød and Roskilde.

CAR-SLEEPER SERVICE BETWEEN SHEFFIELD AND EXETER.—British Railways, Eastern Region, again plans to run a special car-sleeper service between Sheffield and Exeter from May 15 to September 25, 1960. This facility, which was introduced in 1958, proved so popular that it has been decided to extend the period of operation this year. Covered vans will be provided for the transport of cars, with sleeping accommodation on the train for passengers. An inclusive fare for both passenger and car of £15 10s. for the return journey will apply and for additional passengers, £4 10s. for adults and £2 10s. for children.

ELECTRIC RAILWAY TRACTION SECTION

Silicon Rectifier Traction in Germany

THE rapid development of silicon rectifiers is reflected by the fact that although the first tests in this country of such a rectifier for traction duty were announced as recently as 1958 the British Transport Commission last year ordered 42 motor coach equipments with silicon rectifiers from the English Electric Co. Ltd. Clearly, much useful experience has been gained in a short space of time, so that the Commission has been able to proceed at once to a quantity order rather than follow a policy of equipping a few prototypes. We recorded in our November 20 issue that Continental practice with semi-conductors still tends towards limited applications, and this is still true in Germany, although the German Federal Railway had a shunting locomotive with silicon rectifiers on test as long ago as May, 1957. Some particulars of this trial installation were given in our issue of October 24, 1958. The latest silicon rectifier application on this railway is still on a small scale and concerns three Bo-Bo locomotives of 3,180 h.p. for operation on 16 2/3 cycles and 50 cycles, with provision on the latter frequency for working at a line voltage of 20 kV. or 25 kV. This is necessary so that the locomotives may run both on the 20-kV. Hollental line in Germany and eventually on 25-kV. lines of the French National Railways, with which the German electrifier system may connect in due course at Ueberherrn, and between Sarrebruck and Stieringen-Wendel.

A description of the silicon rectifier equipment supplied by Siemens-Schuckert for one of these locomotives appeared in the November, 1959 issue of *La Traction Electrique dans les Chemins de fer*. It was then stated that the high efficiency, heavy current capacity, and low reverse current characteristics of silicon elements enabled rectifiers to have specific weights as low as about 3 oz. per kilowatt, including provision for cooling. The arrangement adopted in the locomotive consists of four bridge circuits, each supplying a separate motor and connected across an individual low-tension winding of the transformer (a multi-section winding having been desirable in any case because of the higher inductive voltage drop on 50 cycles). Each motor circuit is thus quite separate from the others and an abnormal condition in any one of them does not react on the remainder. Each rectifier assembly is built round the duct from a blower to the corresponding traction motor and is cooled by the same air flow, the rectifiers raising the air temperature by only a few degrees (efficiency is quoted as over 99 per cent) and therefore having no effect on the efficiency of the motor cooling. This arrangement saves valuable space inside the locomotive and permits an equipment layout with wide side corridors and adequate end room. The four blowers are situated directly above the motors they serve, and the combined rectifier and motor cooling is therefore achieved with short and direct air circuits.

Silicon rectifiers are also used in the locomotive for motor excitation during rheostatic braking, and for supplying most of the auxiliary machines. For braking, the motor fields are excited in series, and the effort is controlled by the normal field shunting resistors and cam groups, the resistors being reconnected in series with the motors for this purpose. The two motors in each bogie form a single braking circuit with one braking resistor and one stabilising resistor, the latter carrying both the braking and the excitation currents. Each pair of braking and stabilising resistors is mounted inside the locomotive in a common casing with its own ventilating fan. The d.c. auxiliary motors are supplied by a bridge rectifier circuit with silicon elements similar to those of the traction rectifiers, and connected to the transformer auxiliary winding through a changeover switch which adjusts the tap connection so that on any of the three line voltages a substantially constant voltage for auxiliary drives and train heating is obtained. This rectifier is mounted on the transformer oil-cooling blower so that the element cooling fins project into the blower air stream. The transformer oil pump is driven by a totally-immersed three-phase motor fed through a d.c./a.c. converter, and a further silicon rectifier converts part of the a.c. output

into d.c. for the 110-V. control and lighting circuits and battery-charging. It is stated that the silicon rectifiers in this locomotive can be operated at a temperature of 140° C. Many variations of the arrangements described will suggest themselves in different circumstances, but it is clear that the advent of semi-conductor rectification can lead to fundamental changes in the physical layout of a.c. locomotives as well as in their electrical characteristics.

British Contribution to Lisbon Underground

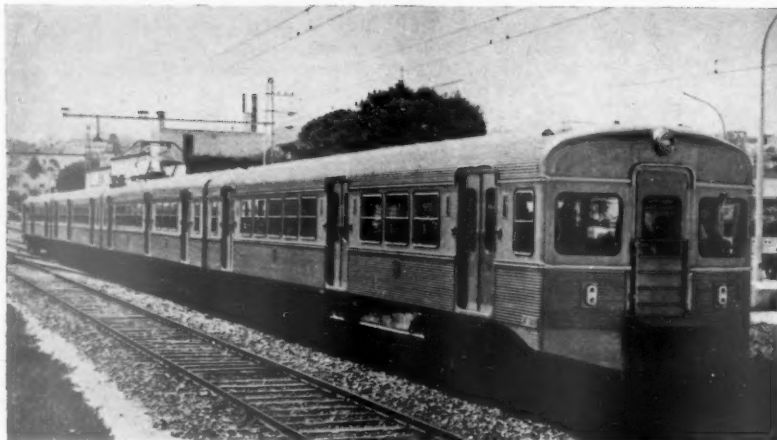
COMPETITION for contracts in connection with the first stage of the Lisbon Metropolitan underground railway was exceptionally keen, and it is satisfactory that a British firm secured orders for the essential services of power supplies, ventilation and pumping. It is typical of the facilities which the British electrical industry can offer that these diverse installations were handled by one main contractor, the General Electric Co. Ltd. of England, within whose organisation the necessary specialised experience was available. Railway administrations contemplating electrification will appreciate the convenience of the comprehensive contract in which all details are handled and co-ordinated through a central source, and this is the direction in which current reorganisation schemes in the industry as a whole are tending. The electrical supply facilities for the Lisbon underground on the section opened on December 29 (see our January 8 issue) comprise a main substation and an underground traction substation, both near Rotunda Station.

Power received at 10 kV. from the national grid is distributed at 3 kV. to the various stations, where it is transformed down for lighting, pumping, ventilation and other services. A diesel-alternator set can be connected to the 3-kV. busbars in the event of a power failure and is of sufficient capacity to maintain lighting, and also to enable trains which may have stopped in the tunnel to be moved to the nearest stations. From the 10-kV. busbars in the main substation two feeders run to the traction substation, where two twin-cylinder 1,500-kW. rectifier equipments are installed for the 750-V. d.c. traction supply. The ventilating system is in two parts, one serving the stations and tunnels, and the other providing independent ventilation of the electrical substations. Thirteen pumping stations have been equipped with a total of 20 pumps manufactured by Lee, Howl & Co. Ltd., of a design which will pass solids such as stones, cinders, or refuse drained from platforms and tracks without choking. The two-car trains on the underground, built by Linke-Hofmann-Busch G.m.b.H., were illustrated in our November 20 issue. At the request of the railway authorities, the seating arrangements have been planned on similar lines to those of London Transport rolling stock. The driving cabs are fitted with control desks in which meters and a panel for auxiliary switches and indicator lamps are incorporated. The rear-end cab is occupied by the guard, who has the use of a microphone for announcing the names of stations before stopping so that passengers wishing to alight are warned in ample time for making their way towards the doors. Trains are being operated at present on a five-minute headway, and are confined to two-car formations, the maximum length of the present platforms.

As mentioned in our January 8 issue, the double-track line is wholly in tunnel. Most of it was made by cut-and-cover, but there is a section of tunnelling between Rotunda and Parque Stations where the line passes under the Eduardo VII park. During these excavations, special measures were taken to shore up a massive memorial and statue while the tunnel was being driven below. Access to the platforms at Rotunda is by escalator, but elsewhere it is by ordinary stairs. Station concourses and passages are embellished with traditional forms of decorative tiling and mosaic patterns. Work is to be continued as rapidly as possible on the second section of the line to Alvalade, and it is possible that this will be opened in stages as a measure of progressive relief to the city traffic problems.

Developments on the Estoril Railway

Delivery of new multiple-unit rolling stock and relaying of permanent way with long-welded rails



Four-car train of Budd-type stock with electrical equipment by the General Electric Co. Ltd.

THE 5-ft. 6-in. gauge double-track Estoril railway runs from the Cais do Sodre terminus in Lisbon to Cascais. There is also a short branch, leading to the first stadium to be constructed in Portugal, which diverges from the main line at Cruz Quebrada and carries an intense traffic on sporting occasions. Of the 16 intermediate stations on the main line the great majority serve equally thriving residential districts, while the whole of the Estoril group has to handle, in addition, a very heavy movement throughout the summer season.

The line is electrified at 1,500 V. d.c. Current is distributed to the overhead conductors by four feeder cables, two on each side of Paço de Arcos substation.

Rolling Stock

There is still a number of old multiple-unit trains in service, with electrical equipment supplied by A.E.G. of Western Germany in 1926, but in 1950 the Sociedade Estoril took delivery of the first batch of modern vehicles built by Cravens Limited and fitted the electrical equipment supplied by the General Electric Co. Ltd., and a total of 21 such coaches is now in service.

During July 1959, the rolling stock position was materially improved with the introduction of three new four-car electric trains, built in Portugal to Budd type design by the Sociedade Reunidas de Fabricacoes Metalicas Lda (Sorefame) of Amadora. These trains are fitted with traction equipment supplied by the General Electric Co. Ltd. In addition to the three four-car units an extra four trailers have been supplied.

The trains are of normal make-up, comprising a driving trailer at each end with a motor coach and a trailer between them, all permanently coupled together. They have been designed to provide a better service between Cascais and Lisbon

by taking advantage of the higher maximum permissible track speed of 56 m.p.h. They are used mainly on a limited stop service, but provision has been made for all-station running if desired.

In providing the increased performance of the new stock it was desirable to use similar traction motors to those fitted to the earlier G.E.C. stock. It was found possible by increasing the degree of field weakening in the original design of motor to provide the required balancing speed of 56 m.p.h. on level track for a normally loaded train of the new stock. This raised the r.m.s. current for the all-stations service above the continuous rating of the motor.

It was therefore necessary to provide an alternative field strength for use on the

all-station service, which reduced the r.m.s. current to an acceptable value without serious effect on the train performance between the stations which are approximately one mile apart.

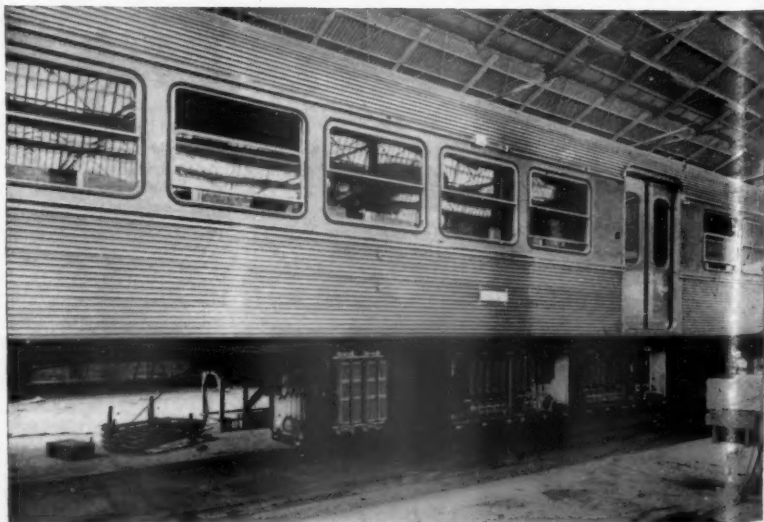
The lower performance characteristic for the all-station service was made the same as the weak field characteristic of the original stock by a combination of field tapping and diversion, so that multiple working of old and new stock would be possible after modifying the control circuits, draw gear and brake equipment of the earlier stock.

The overall train length over buffers is about 260 ft. and the tare weight approximately 130.5 tonnes. All coaches are designed with large vestibules at each end and in the centre in which tip-up seats are installed. All doors are pneumatically operated and a central passage-way provides access from coach to coach through end doors.

Layout of Electrical Equipment

To make the best use of the adhesive weight, each motor coach has four axle-hung motors, two in each bogie, with the motors driving through solid wheels and pinions. L.T. control gear is installed in cupboards in the passenger vestibules of the motor coach, the main power equipment being carried in dust-tight cases on the underframe with a separate line switch section with extended arc chutes to enable any arc to clear to atmosphere. The main starting resistances which are protected from stones and ballast by screens, are mounted on the underframe and fully exposed for maximum ventilation.

The motor generator set and the air compressor are also mounted on the underframe with the various air reservoirs



Main power equipment mounted in dust-tight cases on the underframe of the motor coach

and associated air apparatus; all this equipment is readily accessible from the track side and can be inspected without the use of a pit.

As stated above it was found possible to use the original design of motor in the new trains by modifying the field coils. This had the advantage that parts would be interchangeable. A further modification specified by the Estoril Railway was the use of roller instead of journal bearings to support the traction motor on the axle. The bearings are carried in housings at each end of a tube, which is clamped to the motor. To prevent any possibility of the suspension bearings failing because of the passage of return current through them, the bearing assembly is insulated from the motor frame, the return current being carried to the axles by insulated brushgear.

Each motor has a continuous rating of 130 h.p. and an hourly rating of 165 h.p. at 750 V. full field. The corresponding ratings on tapped field are 140 h.p. and 170 h.p. respectively. Each motor coach thus has a total maximum continuous rating of 560 h.p.

The totally enclosed motor generator sets are identical with those installed in the original G.E.C. locomotive and motor coaches. The output of 8 kW. at 110 V. is greater than that required for the new stock but the advantages of standardisation justified the provision of somewhat larger sets than was necessary. With the exception of the reversers which are electro-pneumatic drum switches and the hand operated motor cut-out switches, all the power circuits are formed by electro-pneumatic contactors.

Power is collected from the 1,500 V. overhead by a single pan pantograph fitted with carbon strips, and is fed to the electrical equipment through an isolating and earthing switch mounted on the roof. The four motors are controlled in two groups of two, each pair being permanently connected in series, so that the motors are wound for 750 V. but insulated for 1,500 V. As is usual on multiple-unit stock, the motors are first connected in series and then in series-parallel, a bridge transition being used at the changeover.

Two steps of field weakening are adopted. The first is obtained by diverting a portion of the field, and the second by direct field tap. Overload or fault protection is provided by overload relays in each motor leg. The connections and inter-locking of the line switches is such that resistance is always inserted in series with the fault before final rupture of the circuit regardless of the leg in which the fault occurs. This simple and efficient method is capable of dealing with all the fault currents that are liable to occur within the settings of the track supply protective gear.

Control System

In general, the control scheme follows normal practice. There is interlocking between the master controller, reverse, and accelerating drum, and the usual four power positions are provided; shunting, series, parallel, and weak field. The

fourth position gives either first or second weak field as permitted by the weak field relay, but under the overriding control of an express/suburban switch mounted in the driver's cab.

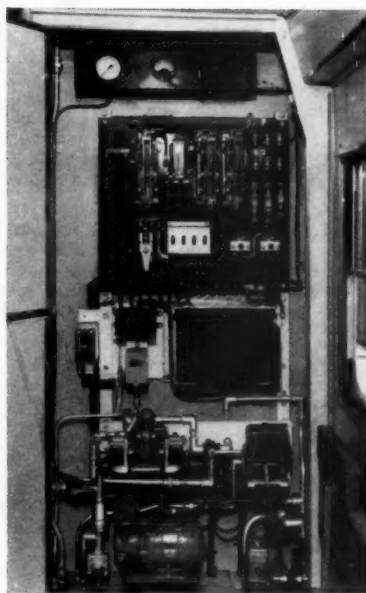
Two settings of the current limit relay are provided, to allow for variations in service and weather conditions, and these are selected by providing two forward positions on the master controller reverse drum, the first giving a lower setting to the current limit relay than the second. The change to the higher current setting is made by energising the set-up coil of the current limit relay, thus causing it to arrest progression at a higher motor current value.

No-volt and no-current protection are provided by a relay having two windings: one a shunt winding energised from the l.t. supply through a contact on an h.t. indicator so that it is only energised when there is an h.t. supply; the other a series winding which carries the power current.

A deadman's system incorporating a time delay is fitted. The trains are designed for multiple-unit operation, automatic couplers making the air and electrical connections between units, while electrical control connections between coaches of a unit are made by standard G.E.C. couplers with butt type contacts. It is unlikely that more than two units would be coupled together for multiple operation due to the restricted lengths of the station platforms.

Auxiliary Equipment

The 110 V. l.t. supply is derived from the motor generator set, with a nickel iron battery to provide emergency lighting and essential control supply in the event of m.g. failure. The l.t. voltage is maintained at the nominal figure by a carbon pile voltage regulator. It has a series winding to lower the volts and prevent excessive charging currents should the battery become completely discharged. The battery contactor is controlled by a polarised reverse current relay.



L.T. control gear installed in a cupboard in the vestibule of the motor coach

Air for the pneumatic brakes, pantograph, warning horns and control gear is supplied by a Westinghouse "DHC2" compressor with 1,500 V. motor. It operates under the control of a compressor governor and is protected by an overload relay which can be reset from the l.t. cupboard. In addition a small battery-operated air compressor can be used to raise the pantograph if the normal supply of compressed air is not available.

To prevent the motor generator set or sets shutting down when the driver changes ends, the m.g. contactor is controlled by a set and trip auxiliary relay, controlled by the pantograph push buttons, so that as long as the train line

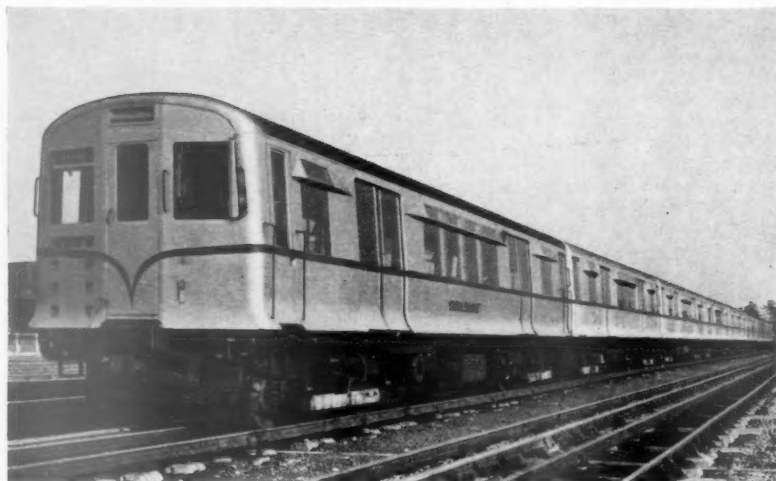
(Continued on page 80)



A section of the line between Alcântara and Belém, showing long-welded rails and reinforced concrete sleepers

New Stock for the District Line, L.T.E.

Non-driving motor cars with unpainted aluminium-alloy bodies



Eight-car train at Upminster Depot. The second, third, fourth, fifth and seventh cars are of unpainted aluminium-alloy "R.59" stock

TWO six-car and one eight-car trains of "silver" "R" stock cars were recently put into service on the London Transport District Line. Each six-car train is made up of four new non-driving motor cars, with unpainted aluminium bodies, and two converted driving motor cars, which have been painted silver to match the new cars. The eight-car train has five new and three converted cars. The 13 new cars, known as the "R.59" stock, were built by the Metropolitan - Cammell Carriage & Wagon Co. Ltd. who, in 1952-53 built the "R.49" cars with which the new stock is almost identical. They are all non-driving motor cars, that is, they have motored bogies but no driving position.

Aluminium Alloy Bodies

The main feature of the aluminium alloy cars, both "R.49" and "R.59," is the saving in weight compared with the "R.47" steel cars which they so closely resemble. The weight of the car body, complete with all equipment, seats, finish, and so on, is reduced from 17 ton 16 cwt. to 11 ton 5 cwt., by using light metal instead of steel. The saving of 6 ton 11 cwt. is made up of 5 ton 18 cwt. in the body structure and 13 cwt. by brake, door, and electrical equipment.

General particulars of the cars are as follow:—

Overall length ...	51 ft. 1½ in.
Distance between bogie centres ...	35 ft.
Maximum width over body ...	9 ft. 8½ in.
Height, rail to top of carlines ...	11 ft. 9½ in.
Weight ...	26 ton 13 cwt.
Number of seats ...	40
Maximum passenger load ...	12 ton (192 passengers)

The bogies and wheels are of steel and follow the asymmetric pattern of London Transport bogies with one motored axle

in each bogie, the bogie centre being offset towards this axle to give greater adhesion. The motors, which have a continuous rating of 80 h.p., were originally designed by Crompton Parkinson Limited, and the General Electric Co. Ltd. Those used in the "R.59" stock were supplied by G.E.C. They are of the nose-suspended self-ventilator type and are fitted with roller bearings throughout.

Fluorescent Lighting

The interior arrangement of the cars is the same as in the "R.47" and "R.49" stock. As in those cars, fluorescent lighting by 2-ft. tubes, separated by spacers of similar length and profile, is installed, the rows of tubes and spacers running the full length of the car at the junction of the upper and lower ceilings.

The shoe gear fitted to the earlier stock is of spring-borne type mounted on insulated brackets carried on the bogie frame, without the conventional shoe-beam. All shoes on a bogie can be lifted from the current rails by a capstan-type handle in the side of the bogie. In the new stock, this method of mounting the shoe gear has been modified and a return has been made to the use of axlebox-mounted shoe beams for carrying the positive shoes and controlling the height of the frame-mounted negative shoe. Another change is that the cars, and the converted driving motor cars which run with them, are equipped with modified synchronised compressor control circuits for ensuring that all compressors cut in and out at the same time, equalising the wear. Because of this, it is not possible to operate the new trains coupled with the red-painted vehicles of the "R" stock until the latter have

been modified in a similar fashion.

To complete the trains, seven "Q.38" trailer cars have been converted at London Transport Acton Works to driving motor cars. These seven vehicles, which have been re-classified "R.38/3" are some of a large number built just before the war, all of which were so designed that the trailer cars could be converted to driving cars at a later date. Advantage has now been taken of this convertibility to provide driving cars from existing vehicles. All but six of the driving cars on existing "R" stock trains have been provided in this way from converted trailer cars.

The provision of these new trains on the District Line has made more "Q.38" trailer cars available for conversion, to enable five-car Circle Line trains to be made up to six cars.

Developments on the Estoril Railway

(Concluded from page 79)

key switch is closed, the driver can stop or start the m.g. sets and raise or lower the pantographs from any driving position.

In addition to the multiple-unit trains, there are three electric locomotives, used mainly for freight traffic. Exchange is made with the Portuguese Railways by a spur from a branch crossing the Estoril line on the level at Alcântara and serving the docks in that area. The largest of these locomotives was built by the North British Locomotive Co. Ltd., with G.E.C. electrical equipment, and all three are also employed at times in the haulage of passenger trains. Because they are usually marshalled in the centre in order to avoid running round at the termini, the multiple-unit system of operation is, in effect, preserved.

A considerable amount of work has been undertaken in recent years to modernise station premises, and work of this nature is still continuing. Work was started recently on rebuilding the stations and laying additional running lines at Algés and Oeiras.

Permanent Way Work

The permanent way is also being progressively renewed to handle increased and speedier traffic. One aspect of this work is the progress made with long-welded rails laid on reinforced concrete sleepers; so far some 15 miles of line have been equipped.

Both at Cais do Sodré and Cascais modern signalboxes for controlling all points and signals electrically have been installed and at the latter station a great deal has been done to improve both track and platform accommodation. New boxes are planned for Cruz Quebrada, to control the points leading to the stadium line and in the station itself, and for Algés and Oeiras.

RAILWAY NEWS SECTION

PERSONAL

Mr. R. C. S. Low, Diesel Assistant to the Chief Mechanical & Electrical Engineer, London Midland Region, British Railways, has been appointed Works Manager, Horwich.

Sir Reginald Wilson, Chairman of the Eastern Area Board of the British Transport Commission, and a member of the Transport Commission will succeed Lord Rusholme,

1955), and "Structure and Purposes in Transport Organisation" (read to the Midland section of the Institute in Birmingham in 1956). In 1953 he was presented with the Triennial Award of Merit, the highest award of the Institute. He was first elected to the Council of the Institute of Transport in 1954. He became Vice-President in 1956, and President in 1957.

Maj.-General G. N. Russell, C.B., C.B.E., Member of the London Midland Area Board

1953, General Russell became responsible to the Commission for the return to private enterprise of the greater part of the B.R.S. fleet. The passing of the Transport (Disposal of Road Haulage Property) Act, 1956, brought disposals to an end, and General Russell was responsible for consolidating the remaining 16,000 vehicles and of operating them through the medium of five limited companies, all trading under the name British Road Services. He was appointed a full-time Member of the British Transport



Sir Reginald Wilson

Appointed Chairman, London Midland Area Board,
British Transport Commission



Maj.-General G. N. Russell,

Appointed Chairman, Eastern Area Board,
British Transport Commission

Chairman of the London Midland Area Board, in April. Sir Reginald Wilson has spent a great deal of his time abroad but, since his return to this country on the outbreak of the 1939-45 war, has been closely connected with the transport world. As Director of Finance at the Ministry of War Transport he was responsible for the financial aspects of wartime shipping, the railway agreements, and the operation of the inland road haulage scheme. He was adviser on special matters to the Control Commission for Germany early in 1947 and a member of the Royal Commission on the Press. He was knighted in 1951, became a member of the British Transport Commission in 1953, and Chairman of the Eastern Area Board in 1955. He is also a director of the Scottish Omnibuses group, which covers most of the bus services in Scotland. Sir Reginald Wilson is the author of several notable papers, including "The Framework of Public Transport" (read at the Glasgow Congress of the Institute in 1953); "For and Against Monopolies in Transport" (read to the Irish section of the Institute in Dublin in

of the British Transport Commission, will succeed Sir Reginald Wilson as Chairman of the Eastern Area Board in April. General Russell was educated at Rugby and at the Royal Military Academy, Woolwich, and was commissioned in the Royal Engineers in 1918. Between the two wars, he served in India, Iraq, and Canada. He specialised in transportation, and was attached to the Great Western and the London & North Eastern Railways for periods of twelve months. He also commanded the 8th Railway Company R.E. for three years. During the 1939-45 war, he was Director of Movements in the Middle East and later responsible for all military transport in India. After the reoccupation of Singapore, he became Transportation Adviser to the Special Commissioner in South-East Asia. In 1948, he was appointed Chairman, Road Transport Executive. By the end of 1951, nearly 4,000 separate undertakings with 40,000 vehicles were amalgamated to form a national road haulage undertaking, British Road Services. A change of Government brought about a change in policy, and in

Commission in February last year. General Russell was made a C.B.E. in 1943 for his services in the Middle East, and C.B. in 1946 for his services in India. He was President of the Institute of Transport, 1958-59. He became a Member of the Council of the Institute in 1953, and was a Vice-President, 1955-58. He has served on the Membership Committee from 1953 and has given papers to many sections of the Institute. He delivered the Henry Spurrier Memorial Lecture in December, 1957.

Mr. G. W. Brimyard, Public Relations Officer, Great Eastern Line, Eastern Region, British Railways, has been appointed District Commercial Officer, Norwich.

We regret to record the death on January 6, at the age of 72, of Brigadier H. L. Woodhouse, Director of Civil Engineering, Railway Board, India, 1934-38.

Mr. C. E. Horton, Research Director, Fisons Limited, has been elected a Vice-Chairman of the company.

Mr. Sydney George Hearn, C.V.O., O.B.E., M.Inst.T., Assistant General Manager, Eastern Region, British Railways, is retiring on March 31. He joined the Great Western Railway in the Plymouth Division in 1911. After four years of service with H.M. Forces during the 1914-18 war, he was nominated, in 1921, for special training, being the first Traffic Department candidate so selected. He gained further experience in the Goods, Traffic, Locomotive Running, Signal, and South Wales Docks departments, following which he was engaged on special duties in the offices of the General Manager and Superinten-

1948, he was appointed an Officer of the Order of the British Empire, and in 1958 was awarded the C.V.O. In 1950 he visited the U.S.A. as Operating Member of a party studying railway working conditions under the auspices of the Organisation for European Economic Co-operation. He has also been a member of Operating Study Groups selected to visit France. Mr. Hearn is a Lt.-Colonel in the Engineering & Railway Staff Corps, R.E. (T.A.). He became Assistant General Manager, Eastern Region, in 1958.

Mr. A. A. Harrison, Chief Freight Officer, British Railways Central Staff, British

ment he was subsequently confirmed. He joined the commercial team at Railway Executive Headquarters, at the beginning of 1948, as Executive Officer (Road Transport) and was concerned with railway road transport affairs and with road-rail co-ordination. Following the changes brought about by the Transport Act, 1953, he became Chief Charges Officer, assisting in the promotion of the Railway Merchandise Charges Scheme and was responsible for the introduction and development of the new freight charging arrangements. In 1958 he took over other freight commercial responsibilities and became Chief Freight Officer. Mr.



Mr. S. G. Hearn

Assistant General Manager, Eastern Region,
who is retiring



Photo]

Mr. A. A. Harrison

Appointed Assistant General Manager, Eastern
Region

[Elliott & Fry

dent of the Line. He was appointed Junior Assistant to the Divisional Superintendent, Newport, in 1930; Chief Clerk to the Divisional Superintendent, Worcester, in 1933; Assistant Divisional Superintendent, Newport, in 1936; Divisional Superintendent, Gloucester, in 1939; Assistant to the Superintendent of the Line in 1940, Operating Assistant in 1941, and Principal Assistant in 1945. In 1946 he became Assistant Superintendent of the Line, which position was re-designated Assistant Operating Superintendent, Western Region, in October, 1948. In May, 1951, he was appointed to the London Midland Region as Operating Superintendent, and, at the special request of the British Transport Commission, returned to the Western Region as Chief Operating Superintendent in January, 1956. Mr. Hearn was made a member of the Council of the Institute of Transport in 1945 and was a member of the Committee of the Metropolitan Section of the Institute from 1953 until 1956 when he was elected Vice-Chairman of the Metropolitan Section. In the New Year's Honours List of January,

Transport Commission Headquarters, has been appointed Assistant General Manager, Eastern Region, British Railways, Mr. Harrison was educated at Kilburn Grammar School, and started his railway career with the London & North Western Railway. He joined the North Eastern Railway in 1922, and, after a period of training in the north, took up staff work in the Chief General Manager's Office, L.N.E.R., at Kings Cross. In 1926 he was appointed Assistant to the Southern Area District Manager, Leeds, L.N.E.R., and continued in a similar position when the Southern and North Eastern Area district offices at Leeds were combined. He took a special interest in cartage work, and was appointed Road Motor Superintendent for the North Eastern Area in 1933, becoming Cartage Manager in 1941. As such he was responsible for the development of a comprehensive railhead collection and delivery system in North East England, and the mechanisation of most of the cartage work in the towns. In 1943 he returned to the Southern Area as Acting Assistant Goods Manager, in which appoint-

Harrison was Chairman of the Yorkshire Section of the Institute of Transport from 1941 to 1943 and a member of the Council of the Institute from 1953 to 1956.

Mr. Percy M. Holman, Chairman & Joint Managing Director of Holman Brothers Limited, has been awarded the O.B.E. in the New Year's Honours List.

Mr. Charles J. Mays, Schedules Superintendent (Road Transport), London Transport Executive, retires on January 23. He is succeeded by Mr. N. S. Eagles, Senior Executive Assistant. Mr. Eagles becomes an officer of the Executive.

Mr. C. G. Wallace and Mr. W. Scott, Secretary and Chief Accountant, respectively, of the Metropolitan-Cammell Carriage & Wagon Co. Ltd., have been appointed to the board. Mr. Scott has also been appointed Joint Secretary with Mr. Wallace and will continue as Chief Accountant. Mr. P. D. Brunton has been appointed General Manager of the Bus Division.



Mr. D. D. Cruickshank

General Manager, Renfrew, Dalmuir & Dumbarton Works, Babcock & Wilcox Ltd., awarded C.B.E.



Mr. D. A. Harris

Appointed District Engineer, Bangor, London Midland Region



Mr. J. E. W. Morecroft

Appointed Audit Accountant, Western Region

Mr. D. D. Cruickshank, E.D., B.Sc., M.I.C.E., M.I.Mech.E., General Manager, Renfrew, Dalmuir and Dumbarton Works of Babcock & Wilcox Limited, who, as recorded in our January 8 issue, has been awarded the C.B.E. in the New Year Honours List, was educated at Dollar Academy and Edinburgh University, where he graduated with the Degree of B.Sc. in Civil Engineering. Before becoming an undergraduate, he spent three years as a mechanical engineering apprentice with Bertrams & Co., Ltd., in Edinburgh. He began his engineering career in India in 1923 as an assistant engineer to the East Indian Railways, and in 1926 when the system was nationalised, he was transferred to the Indian Railway Service of Engineers. He was appointed Executive Engineer in 1937. In 1941 he recruited, and commanded with the rank of Lt.-Colonel, an Indian Sappers' Company, which was engaged in Iraq on railway building and construction work. In 1943 he returned to India and was appointed Deputy General Manager, East Indian Railway, a year later. In 1947, on partition, he returned to Scotland. In 1948 he was appointed General Manager of the Dalhousie Works of Sir William Arrol & Co. Ltd., and was elected to the board of Directors twelve months later. In 1953 he joined Babcock & Wilcox Limited and on January 1, 1954, was appointed General Works Manager, Renfrew, Dalmuir and Dumbarton Works.

Mr. R. T. Gladwin and Mr. J. B. L. Hoban, Senior Executive Assistants in the Office of the New Works Engineer, Department of the Chief Civil Engineer, London Transport Executive, have been appointed Principal New Works Assistants.

Mr. N. W. Swinnerton, formerly of the Civil Engineering Department, London Midland Region, British Railways, subsequently Railway Engineering Consultant to the Costain Group, has been appointed a Director of Costain Concrete Co. Ltd.

Rhodesian Railways have re-designated the positions of the Agent, Lorenzo Marques and the Sub-Agent, Beira. Mr. R. C. H. Hackshaw, who is at present at Lorenzo Marques, is now known as Rhodesia Railways Representative, and Mr. A. B. Widger at Beira is re-designated Agent, Rhodesia Railways.

Mr. D. A. Harris, A.M.I.C.E., Assistant (Maintenance), in the Chief Civil Engineers Office, Southern Region, British Railways, who, as recently recorded, has been appointed District Engineer, Bangor, London Midland Region, was educated at Sherborne and Trinity Hall, Cambridge, where he obtained an honours degree in Mechanical Sciences in 1940. During the 1939-45 war he served with the Royal Engineers, and was awarded the M.C. in Tunisia and the M.B.E. in Italy. Mr. Harris joined the Chief Civil Engineer's Department at Euston in 1946, gaining experience in most Sections of the Department, including the Resident Engineer's Office, Manchester, and the District Engineer's Office, St. Pancras. In February, 1951, he transferred to the District Engineer's Office, Eastleigh, Southern Region, and was appointed as Assistant to District Engineer, Brighton, in November, 1952. Mr. Harris became Assistant District Engineer, Taunton, Western Region, in March, 1954, and returned to Southern Region as Assistant (Maintenance) in Chief Civil Engineer's Office in January, 1956.

Mr. R. V. Baugham, Technical Assistant, Chief Civil Engineer's Office, Kings Cross, Eastern Region, British Railways, has been elected an Associate Member of the Institution of Civil Engineers.

Mr. Alfred Sams, Assistant General Secretary, Transport Salaried Staffs' Association, has retired. He is succeeded by Mr. T. G. Bothwell, formerly Scottish Secretary, T.S.S.A.

Mr. R. Wigmore, Secretary, Wilts & Dorset Motor Services Limited, has been appointed Secretary, Western and Southern National Omnibus Companies Limited, with effect from February 1, 1960.

Mr. D. G. Finley, Secretary of Cumberland Motor Services Limited, has been appointed Secretary of Wilts & Dorset Motor Services Limited, with effect from February 10.

Sir Owen Wansbrough-Jones has been appointed a Director of British Oxygen Co. Ltd.

Mr. G. W. Powell, a Director of the Esso Petroleum Co. Ltd. since 1957, has been appointed a Managing Director.

Mr. J. E. W. Morecroft, A.C.I.S., Assistant Audit Accountant, Western Region, British Railways, who, as recorded in our December 4 issue, has been appointed Audit Accountant, joined the Great Western Railway in 1927. In 1939, he was selected for a course of special training in Revenue Accounting and gained experience in various sections of the Chief Accountants Department. In 1949, he was transferred to the Headquarters of the Railway Executive. Later Mr. Morecroft moved to the Audit Division, Southern Region, and became Chief Clerk of that Division in 1957. He returned to the Western Region in 1958 on his appointment as Assistant Audit Accountant.

Mr. John Bonar Macoll, Publicity Manager, Dunlop Rubber Co. Ltd., has retired.

Mr. N. A. H. Tomblin has been appointed Secretary of the British Electrical Power Convention. He succeeds Mr. J. W. Simpson.

The Administrative Council of the Federal German Railways has elected Dr. Hermann Abs, a Director of the Deutsche Bank, as its next President. The election has to be confirmed by the President of the Federal Republic. Dr. Abs will be the West German member of the small group to report on the economic needs of India and Pakistan at the request of the World Bank.

Mr. F. C. Wright, Managing Director, Standard Telephones & Cables Limited, and Mr. John Grimston, Managing Director of Enfield Cables Limited, and Enfield Rolling Mills Limited, will alternate as Chairman of the newly-formed Enfield-Standard Power Cables Co. Ltd., which will handle the merged power cable businesses of the two companies. Mr. E. C. Lee will be General Manager of the new company.

Mr. E. Bryan, Technical Director, Transport Sales Development Department, of the Tube Investments organisation, is resigning at the end of January. He will become Technical Director of Tullloch Limited, New South Wales, Australia. Mr. Bryan served his apprenticeship with the British Railways at Derby, and spent some years with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., at Saltley before joining Tube Investments Limited.

Mr. J. Stacey, Acting Assistant Stores Superintendent, Eastern & North Eastern Regions, British Railways, has been appointed Supplies & Contracts Manager, Eastern Region.

Mr. F. W. Giles has been appointed a Principal Executive Assistant, London Transport Executive, with the title of Staff Superintendent (Central Road Services). He will be responsible for all staff matters in the Department of the Operating Manager (Central Road Services).

Mr. R. T. W. Anderson, has been appointed District Manager, Birmingham Works, British Electrical Repairs Limited. He succeeds Mr. J. Ashmore, who has retired.

Mr. A. E. Bates, Technical Sales Engineer, London, English Electric Co. Ltd., has been appointed Manager of the company's office in Edinburgh. He succeeds Mr. W. M. Todd, who was recently transferred to manage the Bristol office.

Mr. G. W. Hunt, formerly Chief Design Engineer of Commonwealth Engineering Co. Ltd., has been appointed Managing Director of Warden & Mitchell Pty. Ltd., of Lidcombe, New South Wales. Mr. Hunt who is a Production Engineer, is well known to many Australian railway executives and was associated with Commonwealth Engineering Co. Ltd. on many of their recent rolling stock contracts.

Mr. W. S. Richards has been appointed Managing Director of Brightside Heating & Engineering Co. Ltd., of which he has been a Director for some years. Mr. R. Ivor Slater has resigned from the position of Secretary of Brightside Engineering Holdings Limited on his appointment as Managing Director of Moorwoods Limited. Mr. James R. Nuttall has been appointed Secretary of Brightside Engineering Holdings Limited.

Mr. A. S. King, Executive Director, Vacuum Brake Co. Ltd., has retired. Mr. King joined the company in 1920, and was shortly transferred from secretarial duties to the sales side. He was appointed Assistant Sales Manager in 1942, and Sales Manager the following year. He joined the board in 1952. When the Vacuum Brake Co. Ltd. was absorbed into the Birfield Group in 1954, Mr. King remained on the board as Executive Director.

Edgar Allen & Co. Ltd. has announced the reconstruction of the boards of Directors of four subsidiary companies in the United Kingdom. They are as follows: *British Rema Manufacturing Co. Ltd.*: Brigadier A. Levesley, Mr. W. J. McBride, Mr. J. P. Lewis, Mr. W. G. A. Jenkins, Mr. J. Higginbotham; *Buell (1952) Limited*: Mr. W. J. McBride, Brigadier A. Levesley, Mr. O. Margetson, Mr. G. B. Tyler, Mr. M. G. Hill, Mr. F. A. Ross; *J. H. Humphries & Sons Ltd.*: Brigadier A. Levesley, Dr. E. Gregory, Mr. A. Humphries, Mr. G. W. Turton, Mr. F. Haigh, Mr. W. C. Garrison; *Park View Steel Works Limited*: Dr. E. Gregory, Mr. A. H. Baxter, Mr. F. Haigh, Mr. G. C. Longden, Mr. W. H. Everard, Mr. L. F. Keeley. Mr. F. A. Ross will retain his Secretaryship of each of these companies, with the exception of Buell (1952) Limited, where Mr. D. F. Tiplady has been appointed Secretary.

The following appointments are announced by Edgar Allen & Co. Ltd.: Mr. F. Haigh, Deputy General Sales Manager; Mr. L. F. Keeley, General Manager, and Mr. R. E. Sherwood, Deputy General Manager of the Steel Department and Mr. R. Gabbertas, has been appointed Head of the Operational Research Department.

Mr. Harold Melhuish, Assistant Managing Director of the Superheater Co. Ltd., has retired on pension, but will remain a Director.

Dr. W. G. Hiscock, has been appointed Chairman of the Lead Development Association for 1960.

Mr. F. P. Laurens, Assistant Managing Director, Production, of International Computers & Tabulators Limited, has resigned from the board of Vickers-Armstrongs.

Mr. H. M. Gouldon has been appointed to succeed Mr. J. C. Tomlinson, who retired on January 1, as Secretary of the Cunard Steam-Ship Co. Ltd., and of Cunard White Star Limited.

Mr. Michael Clapham, a Joint Managing Director, Metals Division, Imperial Chemical Industries Limited, has been appointed Chairman of the Division. He succeeds Dr. Maurice Cook, who has retired from the company's service. Mr. G. A. D. Smith has been appointed Commercial Managing Director of the Division.

Dipl.-Ing. Oskar Stamm, Chairman of the Board of Management, Krauss-Maffei AG has been awarded the honorary degree of Doctor of Engineering by the Technical High School of Munich. The award is in acknowledgment of his services in connection with the design and construction of rolling-stock and other equipment, and the improvement of production methods in this connection.

Mr. Harold Riggall has resigned from the Chairmanship and from the board of Directors of Davey, Paxman & Co. Ltd., on his retirement from the Managing Directorship of the parent company, Ruston & Hornsby Limited. Sir Percy Sanders, Deputy Chairman, has resigned for health reasons, but remains a member of the board. Mr. W. J. Ruston has been elected Chairman, and Mr. V. R. Prehn becomes Deputy Chairman.

Mr. Charles Holt, Managing Director of Thos. Cook & Son, Ltd., accompanied by Mr. A. J. Turner, Assistant General Manager, left London on January 2 for Egypt, following the de-sequestration of the company's business there. Mr. Holt will then continue on a tour of inspection of the company's offices in Singapore, Australia, New Zealand, and the United States, to discuss the opening of further offices and the development of tourism generally.

Massey-Ferguson Limited has announced further senior executive appointments in the newly established United Kingdom Operations: Mr. I. J. Wallace as Director Planning & Procurement; Mr. T. V. Knox, as Director Marketing; Mr. A. J. Scamp, as Director Personnel & Industrial Relations. For the time being the appointment of Director Manufacturing will be filled by Mr. H. A. Wallace, Vice-President, Manufacturing, Massey-Ferguson Limited, and that of Comptroller by Mr. J. G. Staiger, Assistant to the President. The name of Massey-Ferguson (Great Britain) Limited has been changed to Massey-Ferguson (United Kingdom) Limited. This subsidiary company will provide the management functions required for United Kingdom operations. The Directors are Colonel W. E. Phillips, Mr. A. A. Thornbrough, Mr. E. W. Young, Mr. M. W. McCutcheon, Mr. J. A. McDougald, Mr. E. P. Taylor, Mr. C. W. Webster, Mr. L. Harper, Mr. T. V. Knox, Mr. E. M'Ewen, Mr. M. I. Prichard, Mr. A. J. Scamp, Mr. J. G. Staiger, Mr. H. W. Waite, Mr. H. A. Wallace, Mr. I. J. Wallace. Mr. Russell W. Evans has been appointed Secretary.

Mr. J. A. Dorr has been appointed Chairman of the Fort Dunlop Local Board for 1960.

Mr. J. C. Greig has been appointed Sales Director of the Jacobs Manufacturing Co. Ltd., and Frank Guylee & Son Ltd.

Mr. E. Chatterton has been engaged as Engineering Consultant, to the Coventry Victor Motor Co. Ltd. In collaboration with Mr. W. A. Weaver, Chairman, he will assume full responsibility for all engineering aspects of the company's business.

Sir George Dowty, Chairman, Mr. R. F. Hunt, Mr. Donald Campbell, Mr. L. S. Flatman, General Manager, and Mr. C. J. Luby have been appointed to the board of Dowty Marine Limited the recently formed subsidiary of the Dowty Group.

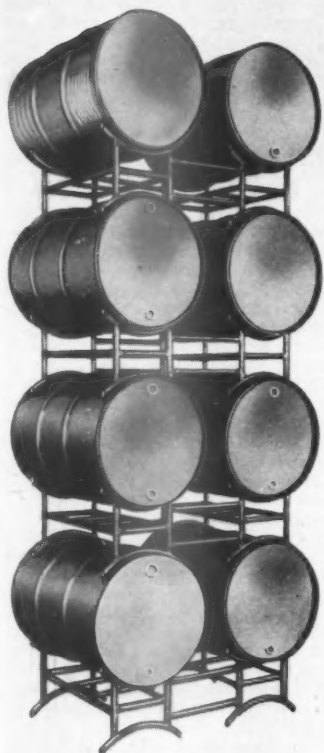
Mr. C. W. Clarke has been appointed General Sales Manager of the newly formed Surform Division of Firth Cleveland Tools Limited. Mr. Clarke will be responsible for the organisation and control of all sales promotion and allied matters. Mr. E. Cragg has been appointed Home Sales Manager, Surform Sales Division.

Mr. T. H. Arnold has, at his own request, relinquished his appointments as Local Director & Controller of the Research Department, Hadfield Group of companies, and also as a Director of the subsidiary companies, Hadfields Steels Limited, and Hadfields Forgings Limited. He will continue to serve the parent company as required. Mr. L. G. Finch succeeds Mr. Arnold as Local Director & Controller, Research Department, and Mr. J. A. Grainger is appointed Deputy Research Controller.

Mr. J. P. Jessop, Manager of the United Steel Companies (Pakistan), Limited, has been appointed Managing Director in succession to Mr. L. L. Boyd, who is returning to Great Britain to become Deputy Commercial Manager of Steel, Peech & Tozer Limited. Mr. R. M. Marshall, who has spent several years with the United Steel Companies (India) Private Limited, and who is completing a two-year course at the Harvard University Graduate School of Business Administration, will succeed Mr. Boyd as Managing Director of the Indian company. As he will not be available to take up his appointment until later this year, Mr. S. B. Wagh, Director & Secretary of the Indian company, will act on his behalf.

Mr. C. T. M. Bagnall, Publicity Manager, English Electric Co. Ltd., has been appointed Manager, Publicity & Information Services. This newly created title carries responsibility for both Public Relations and Publicity Departments. This reorganisation follows the retirement of Mr. J. I. Hall, Public Relations Officer, who remains as a consultant to the group until March 31, during which period he will spend some weeks on company business in America and Canada. Mr. Hall has resigned to attend to personal and family business. Mr. M. B. Schroeder becomes Joint Deputy Publicity Manager (Technical) and will continue to work from Stafford. Mr. C. G. Hollowell, Publicity Manager, D. Napier & Son Limited, is appointed to the parent company as Joint Deputy Publicity Manager (General) working from Marconi House, London. In the Public Relations Department, Mr. E. C. Roberson will be Deputy to Mr. Bagnall on public relations matters, and will continue to be responsible for the company's press relations in the atomic power field. Miss Patricia Hardie, who joined the Press office in 1951, is appointed Chief Press Officer.

NEW EQUIPMENT AND PROCESSES



Universal Drum Pallet

A BIG advantage is claimed for this new flexible drum rack inasmuch as each drum can be lifted direct from the ground on to the pallet using the same fork centres as for lifting the pallet. Fork centres, which are suitable for most other trucking operations, are used. Construction is simplified and low in cost. The pallet is made of tubular steel throughout and is suitable for indoor and outdoor use. It weighs less than 40 lb.

Further details can be obtained from the manufacturer, Powell & Company, Burry Port, Carmarthen, South Wales.

Torque Converter Version of Tournapull Earthmover

THE LeTourneau-Westinghouse Model "D" Tournapull is now available with torque converter transmission.

The new version of the prime mover can be had with any of the standard "D" size interchangeable trailing tools. Some rearrangement of components is involved although most critical dimensions remain unchanged. The unit maintains its 143-h.p. G.M. diesel engine.

The new transmission consists of a single-stage, multiple-phase four-element torque converter combined with a heavy-duty, power-shift gearbox. Four forward and two reverse ranges provide the equivalent of an infinite number of gear ratios with speeds up to 30 m.p.h.

An automatic lock-up clutch eliminates power consuming slippage in the converter at haul speeds. Other improvements include

dry-type air cleaner and enlargement and relocation of the rectifier housing.

The torque converter transmission is claimed automatically to adjust power output regardless of load or terrain. By providing a cushioning effect to shock loads, it is expected to cut maintenance costs, too, by saving wear-and-tear.

Further details can be obtained from the LeTourneau-Westinghouse Company, Peoria, Illinois, U.S.A.

Improved Starting Method

ALL Philips Cryogenic equipment, based on the Philips Universal cooling machine will now incorporate improved starting.

The relatively high torque previously required to start the engine is avoided. The compression ratio across the main piston is much reduced during the initial revolutions of the crankshaft by the connection of a buffer vessel to the compression space in the cylinder. A valve in the line between the two is controlled by the oil pressure in the machine and remains open until the pressure, generated by an integral pump driven from the crankshaft, reaches its normal level. This valve then closes, the compression ratio rapidly reaches its operating value, and the machine begins to run at full speed.

The duration of the idling period is sufficient to allow the motor to pick up speed under very light loading conditions and without abnormal electrical surge. No special clutch and ratchet assembly is necessary; a simple flexible coupling is used to connect motor and compressor. The machine is capable of re-starting immediately after stopping.

Prices of the improved models remain unchanged.

Further details can be obtained from Research & Control Instruments Limited, Instrument House, 207 King's Cross Road, W.C.1.

AM/FM Signal Generator

THE Taylor 61A signal generator is designed mainly for the servicing of A.M. and F.M. high-frequency receivers and the intercarrier I.F. stages of television receivers. The 61A provides, in conjunction with an oscilloscope, complete facilities for the sweep alignment of the R.F., I.F. and discriminator or ratio detector stages of A.M. and F.M. receivers. The speedy and accurate method of ratio detector alignment using simultaneous A.M. and sweep signals is available.

The A.M. generator covers the range 4-120 mc/s in five bands, all on fundamentals. Calibration accuracy is ± 1 per cent. Modulation 35 per cent at 400 cycles. The F.M. and sweep section also operate on fundamentals, avoiding the confusion and poor frequency accuracy inherent in the frequency difference method. The F.M. and sweep bands cover the frequencies 4-12 mc/s and 70-120 mc/s in three bands. Calibration accuracy of the F.M. generator is ± 2 per cent. The A.M. generator may be used as a marker during sweep alignment. A variable phasing network is incorporated and retracting blanking is provided.

Deviation on F.M. is variable up to 100 kc/s from the mean carrier frequency at a modulation rate of 400 cycles. The sweep covers a total band width of 1 m/c at power line frequency. A crystal calibrator circuit with switch selection of any one of three

internally-mounted crystals is incorporated. Crystals which may be selected in the frequency range 1-11 mc/s can be supplied.

All the facilities offered in the 61A model can be selected by internal switching, no cross connections external to the instrument being necessary. There is choice of C.W., A.M., F.M., sweep plus C.W. or sweep plus A.M. by internal switching. When using the sweep facility, the marker level may be continuously varied.

A five-section attenuator with a non-inductive potentiometer ensures accurate attenuation over the whole frequency range. Radio frequency leakage has been reduced to a minimum by careful shielding of the attenuator and oscillator sections. An added facility in the servicing of audio stages is provided by a variable level 400 c/s signal.

Further details can be obtained from the manufacturer, Taylor Electrical Instruments Limited, Slough.

Cheaper Taps

UNATAP—a water-saving tap—has been reduced in price to £5 13s. 6d. each, (£5 4s. 0d. each for orders of a gross).

Further details can be obtained from the manufacturer, Walker, Croswell & Co. Ltd., Cheltenham, Glos.

Cheaper Ball-Bearing Turntables

THE Roballo Engineering Co. Ltd. announces the following general reduction in prices :-

Type	Weight (lb.)	Old Price	New Price
		£ s. d.	£ s. d.
13/400	30	9 0 0	7 15 0
13/500	34	10 0 0	8 15 0
13/650	52	11 14 0	9 15 0
15/500	50	13 5 0	11 10 0
15/650	70	15 19 0	14 6 0
15/850	90	17 15 0	15 19 0
15/1050	123	20 10 0	17 18 0
80/880	112	19 9 0	17 1 0
80/1090	136	20 17 0	18 3 0
90/1100	185	23 11 0	21 10 0
90/1100S	191	24 13 0	22 14 0

In addition, discounts are given on quantity orders. Monthly output of these units now exceeds 3,000, and the standard range of turntables to suit all sizes of trailers from 3-25 tons capacity, is available from stock.

Further details can be obtained from the Roballo Engineering Co. Ltd., 43, Dover Street, London, W.1.



Loadmeter Equipment for L.T.E. Buses

A Loadmeter installation which automatically records information about bus passenger loadings has been fitted by London Transport Executive to an "RT" double-deck bus used on country routes. The equipment was devised and tried out last year by the West Yorkshire Road Car Co. Ltd., which named the device the Loadmeter, but certain modifications have been made in the apparatus as installed by L.T.E. The apparatus is actuated by the weight of a passenger as he takes his seat in the bus, and provides a continuous record, on a paper roll and against a time scale, of the total number of seated passengers on the bus. The apparatus does not record the points on the route to which the respective loadings apply, but these can be deduced from the record, subject to allowance being made for late running.

The bus concerned is RT. 4773, allocated to Staines garage, and painted in country bus (green) livery. It is working mainly on routes in the Staines area. Subject to satisfactory operation, it will be transferred later to other country bus garages.

Method of Actuation

The Loadmeter equipment consists in essence of an electric micro switch under each seat which will send an electrical impulse to a recorder when the seat is occupied. The recording device is a recording ammeter of a type originally used in armoured fighting vehicles.

The switches being used by London Transport are set to operate at a pressure of 14 lb., enough to obviate any risk of their being depressed by shopping bags and so on. Under each seat is a plywood flap, hinged at one side, with the switch under the opposite, free side. When a passenger sits down the flap is depressed and the switch is operated. This method of working the switches has not been used previously and is considered to give better results than previous systems. The seats are securely fastened down to prevent any tampering with the switches. Current is supplied from a special battery and the electrical impulses from the switches are taken to the recording equipment, in which a pen makes a continuous graphical record of the number of seats

occupied. Battery and recorder are mounted under the chassis on the off-side, access to them being through a detachable panel in front of the offside rear wheel of the bus.

The Loadmeter vehicle, with possibly one or two further similarly fitted buses, will be used on various routes from time to time on country bus services to provide information on passenger loadings. More comprehensive loading information, obtained as at present by operating staff, is necessary where routes carry heavier traffic, but Loadmeter records will be useful on wide-headway country routes.

Bridge Rolled in at Amersham, London Transport

Engineers of London Transport Executive rolled in a new bridge span at the country end of Amersham Station, Metropolitan Line, on January 10. The new bridge carries the present two tracks over Station Road. Later this month work will start on building a single-track bridge to carry the main down line when the reconstruction of Amersham Station as the new terminus of the Metropolitan Line is completed.

The old bridge, in use since the Metropolitan Railway was extended to Amersham in 1892, had a 30-ft. span, but the new bridge span is 45 ft., enabling the Buckinghamshire County Council to widen the road beneath.

Work started at about 1.30 a.m. on the Sunday. The tracks were taken up and the waybeams used as temporary track supports between the old abutments and the new were removed. The new abutments were made wide enough to support not only the new double-track bridge but also the single-track bridge to be built later.

Sequence of Operations

The road beneath was closed during the work and the old bridge girders lowered by crane on to waiting lorries as they were cut free. At about 10 a.m. the new 150-ton bridge structure, which had been built on the new abutments at the side of the old bridge, was winched into its new alignment. The steel girder bridge, with concrete deck, was then jacked down into the final position.

The trackwork was ready to take the first train shortly after 3.15 p.m.

During the bridge operations double-deck bus routes were terminated on each side of the bridge and through passengers walked over the station footbridge to catch a bus on the other side. Single-deck buses and Green Line coaches were diverted. The train service between Amersham and Great Missenden was suspended and a special bus service substituted.

Cheaper Transport of Motor-cars to the Continent

British Railways, the French National Railways, and the Belgian Marine, which last year together carried a record number of 250,000 cars across the Channel, have lowered the charges for conveying small motor-cars by sea between British and French and Belgian ports.

A new size classification reduces the cost of the return journey by 18s. The new rate of £3 15s. each way applies to cars not more than 12 ft. long. Until now their owners have had to pay the same as for cars 6 in. longer. Among the cars which come within the new fare are: Austin "A.30" and "A.35"; Standard "8", "10", and "Companion Estate Car"; Ford "Escort" and "Esquire"; Austin-Healey "Sprite"; Fiat "600"; and Renault "750". The cheapest rate of £3 3s. will still apply to cars less than 11 ft. long overall.

For scooters and small motorcycles the standard motor-cycle return charge of £2 8s. had been payable. The new rate for the smallest scooters, 125 cc. or below, is 14s. return to French ports, and £1 return to Ostend. For the larger scooters and small motor-cycles under 250 cc. the charge will be £1 12s.

Extra late-night crossings are to be made at summer weekends by the British and French steamers from Dover to Boulogne and Calais. The three vessels, *Maid of Kent*, *Lord Warden*, and *Compiègne*, will between them make 12 outward trips in 24 hr. There will be extra crossings from Dover to Dunkirk at weekends at the height of the summer.

The car-carrying cargo steamer service between Newhaven and Dieppe is also to be increased in frequency.



New span about to be rolled in. In background is the formation for new down line and sidings



Span in position. Old abutment is in front of longer abutment which will also carry single track bridge

New St. Pancras Diesel Service

The multiple-unit diesel service which came into operation between St. Pancras and Bedford on January 11 confers substantial benefits on travellers in the area served. In off-peak hours, at 35 min. past each hour, a semi-fast train leaves St. Pancras for Elstree, Radlett, St. Albans, Harpenden, Luton, Leagrave, Harlington, Flitwick, and Bedford, taking 42 min. to Luton and 60 min. to Bedford. The corresponding up service is at each even hour from Bedford, in the same times. At each even hour from St. Pancras there is a train calling at all stations to Luton, and taking 51 min.; return workings are at the even hours from Luton. Between Elstree and Luton inclusive there are two trains an hour, and between Luton and Bedford an hourly service.

A considerable improvement has been effected in the morning and evening peak hour service. Compared with the former gap in the suburban service from St. Pancras, from 6.17 to 6.55 p.m. (because of the 6.33, 6.40, and 6.50 p.m. main-line departures), and from 5.58 to 6.50 p.m. in trains to Luton, there are now diesel departures at 6.15 p.m. (St. Albans and all stations to Bedford), 6.20 p.m. (Elstree, Radlett and St. Albans), 6.45 p.m. (Elstree and all stations to Bedford), and 7 p.m. (all stations); between these also is the 6.15 p.m. from Moorgate to Harpenden. Late evening travellers will benefit by the last evening diesel train (except Saturdays) leaving St. Pancras for Bedford at 10.35 p.m., and being 20 min. faster than the previous steam 10 p.m.; and the last to St. Albans and Luton at 11.35 p.m. (previously 11.15 p.m.).

There are similar morning improvements in the up direction. One long-felt want is satisfied by a new 8.30 a.m. diesel train from Bedford, in the former gap between 7.55 and 8.53 a.m., reaching St. Pancras at 9.40 a.m.

Service over "Widened Lines"

There is a radical acceleration of the service to and from Moorgate. The former 5.11 p.m. from Moorgate starts 10 min. later, and with a non-stop run from Kings Cross Metropolitan to Elstree arrives St. Albans at 6 p.m. (9 min. earlier); it is extended from there to Harpenden and Luton (6.16 p.m.). The 5.36 p.m. from Moorgate starts 4 min. earlier, and also has a 19 min. speed-up; it reaches St. Albans at 6.17 p.m. and Luton at 6.32 p.m. The 6.8 p.m. to St. Albans starts at 6.15 p.m., is accelerated by 16 min. and extended to Harpenden. These are diesel-hauled trains of compartment stock.

Similar improvements have been made in the up morning service.

The principal changes in main-line trains are in the down direction, because in general steam trains no longer make any stops between St. Pancras and St. Albans. The former 9.20 and 11.15 a.m., 3.20 and 6.55 p.m. down, now 9.25, 11.25 a.m., 3.25 and 7.6 p.m. respectively, no longer call at St. Albans and Harpenden, and are accelerated 5, 10, 12 and 11 min. to Bedford and beyond. The 8.15 and 12.55 p.m. down omit their St. Albans call and gain 4 min.

The 5.30 p.m. to Leicester starts at 5.25 p.m., ceases to call at Luton, and runs 17 min. earlier from Bedford onwards; the 6.50 p.m. down Manchester does not now stop at Luton and gains 5 min. The 4.45 p.m. to Nottingham, by starting at 4.35 p.m., no longer has to wait at Bedford for the 5.5 p.m. down to pass, and is 23 min. earlier from Bedford onwards. In the up direction the 7.12 a.m. from Bradford to St. Pancras calls additionally at Wellingborough, and reaches St. Pancras at 1 p.m. instead of 12.51 p.m.; the 8.55 a.m. from Manchester omits Wellingborough and calls instead at Luton; the 8.15 a.m. from Nottingham and the

12 noon from Bradford both arrive 5 min. later, at 10.30 a.m. and 5.20 p.m.

A half-hourly diesel service also has been brought into operation between Kentish Town and Barking by the Tottenham & Hampstead and Tottenham & Forest Gate lines, calling at all stations, and taking about 30 min. These trains start and terminate 1½ miles away from St. Pancras, and many of them just fail to connect at Kentish Town, in the down direction especially, with the diesel stopping trains between St. Pancras and Luton; their passengers thus have little option but to use the nearby Kentish Town L.T.E. Underground station to get into and out of London.

Staff and Labour Matters

Statement by Chairman of B.T.C.

The following statement was issued on January 11 by Sir Brian Robertson, Chairman of the British Transport Commission:—

"The British Transport Commission feels that it would be appropriate for it at this time to make the following statement on wages and salaries of the staff of British Railways.

"At the time of the settlement on wages and salaries concluded in June, 1958, it was agreed between the Commission and the trade unions that there should be an impartial review of pay on British Railways by an independent committee of inquiry.

"The Chairman of the independent committee, Mr. Guillebaud, has now told the Commission and the trade unions that he expects to present the report of his committee during April, 1960.

"The Commission appreciates that there is some disappointment at the length of time which has proved necessary for the completion of the report. The problem before the independent committee is a very intricate one, and the Commission is sure that every effort has been made by all parties (including itself) to expedite the work. It is, however, concerned at the effect of the delay on the staff and by the staffing difficulties which are affecting the services in certain parts of the system.

"The Commission cannot, of course, declare its attitude to the report of the Independent Committee of Inquiry until it has received it and studied it. The terms of reference of the Committee provided that 'neither the Commission nor the trade unions can enter into any prior commitments on the report of the independent body, but the parties recognise that, without a genuine desire to reach a reasonable settlement of pay issues, the object of setting up the Inquiry will not be achieved.' It is also possible that, in spite of good will on both sides, it may take some time to deal with the full implications of the report, especially if they involve substantial alterations to the wage and salary structure.

"The Commission wishes to state now that, subject to the nature of the report, it will be prepared immediately on its receipt to discuss with the unions what interim action could justifiably be taken. It would, moreover, be prepared to make any such interim action take effect as from today. The staff concerned can feel that a little further patience will not place them at a disadvantage."

L.T.E. Incentive Bonus Scheme

At a meeting held on January 8 between representatives of London Transport Executive and the Transport & General Workers' Union, London Transport invited the union representatives to collaborate in devising

a bonus scheme for bus drivers and conductors. The object of the scheme would be to improve the quality of the service to the public and to increase staff earnings by a system of additional payments by results based on extra effort and better work. Drivers and conductors would be given a direct financial advantage in carrying more passengers, reducing costs, and giving the best possible service to the public.

Bonus payments would be made which would increase as more passengers were carried and quality of service improved, the results of higher receipts and lower costs being shared between bus crews and London Transport in proportions to be agreed.

Incentive bonus schemes are already operating with satisfactory results in L.T.E. workshops and for certain other sections of its staff. Devising such a scheme for bus services, with their many variable factors, presents many problems, but London Transport believes that these can be overcome with the co-operation of the union and of the staff.

The proposal discussed at the meeting held on January 8 related to the Central Road Services, but a scheme appropriate to London Transport's Country Bus and Green Line coach operations will also be submitted for consideration.

The proposed Central Road Services scheme provided for bonus to be payable under three heads: (1) on fare receipts; (2) for quality of service on a garage-by-garage basis; (3) individual "safety" bonus to drivers and conductors.

The effect of the bonus scheme would be to link the bus crews more personally with the quality of service given. Its operation would not necessitate any extra cost being passed to the public.

At the conclusion of the meeting, it was agreed that further consideration would be given to the scheme by both sides and that further meetings on the matter would be held.

Rail Strike Call

The London District Council of the N.U.R. has refused to cancel its decision to call a one-day rail strike on February 1. Paddington No. 2 Branch of the council will not support the call, neither will the Southern District Council (which covers Waterloo). The South Eastern District Council will discuss the matter at a meeting on January 24.

B.T.C. PORT AND FISH DOCKS CHARGES SCHEMES.—The British Transport Commission has asked the Transport Tribunal to confirm draft schemes for new dock charges at the port of Hull, and for fish and fishing vessels at Grimsby, Fleetwood, and Lowestoft. This carries out the Commission's intention, announced during the hearing of the 1958 Harbours Charges Scheme, to improve the financial situation at these ports. The revised charges for Hull Commercial Docks have been pitched at a level which will produce a reasonable financial return. The draft Scheme provides for new maximum dues for ships, merchandise and passengers, but actual charges within the authorised maxima would be at the Commission's discretion. Existing charges for fish and fishing vessels at Hull, Grimsby, Fleetwood and Lowestoft are wholly inadequate. The draft scheme proposes that revised maximum ship dues on fishing vessels should apply at all four ports, which are the main fishing ports owned by the Commission, and it seeks power to introduce maximum merchandise dues on fish landed at Hull, Grimsby, and Fleetwood. It also provides for revised maximum charges at Lowestoft, where merchandise dues on landed fish are already applied.

Contracts and Tenders

Rolling stock for the Royal Cambodia Railways

The Perry Engineering Co. Ltd., Adelaide, South Australia, has received an order for 75 wagon bodies and four passenger coaches a gift from Australia to the Royal Cambodia Railways under the Colombo Plan.

The Portuguese Railways has placed a contract with the Swedish firm of L.M. Ericsson Signalaktiebolag for the installation of C.T.C. on the line between Setil and Vendas Novas. The total cost of this installation, the first of its kind in Portugal, is estimated at 18,000 contos (£225,000, approximately), and it will operate on 43.5 miles of single track serving nine intermediate stations. The particular stretch selected is an important one, because, after leaving the Northern line at Setil, it links up at Vendas Novas with one of the main routes of the Alentejo which starts from Lisbon Barreiro terminus and serves key points such as Casa Branca (junction for Evora, Estremoz, and Vila Viçosa) and Beja (with connections to the Algarve and the Spanish frontier at Vila Real Sto. Antonio).

South African Railways has placed an order with Alpheus Williams & Dowse Limited for the supply of seven well wagons. Four of the wagons will have a carrying capacity of 100,000 lb. each and the other three 80,000 lb. each. They will consist of a low deck slung between two sets of bogies and will be used for loads of abnormal height. The order is valued at £17,781.

The British Transport Commission, South Wales Docks, has placed the following contracts:—

John Morgan (Builders) Limited: substructure and associated works for new transit shed, North Dock, Newport

The Penarth Pontoon, Slipway & Ship-repairing Co. Ltd.: general overhaul of steam hopper barge, *Viscount Churchill*, South Wales Docks.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Formosa:

4 diesel railcars.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan. The tender No. is US-690. The closing date is February 2, 1960. The Board of Trade reference is ESB/30633/59/I.C.A.

22 express passenger coaches, 3 ft. 6 in. gauge, with one lot of spare parts

3 express dining cars, 3 ft. 6 in. gauge, with one lot of spare parts.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Lu, Taipei, Taiwan. The tender No. is US-693. The closing date is February 23, 1960. The Board of Trade reference is ESB/30652/59/I.C.A.

4 sets of electric rail saw with power unit, rail saw, electric, portable, for sawing rails up to 50 kg/m., time required to cut 50 kg./m. rail about 12 min., with three-phase induction motor, 1 h.p., to be used on 100-110-V. line, 60 cycle

5 sets of pneumatic rail auger with power unit, rail drill with frame, pneumatic, Ingersoll-Rand size RD-40 or its equivalent, non-reversible, hose connection $\frac{1}{2}$ in., spindle of this drill built to take rail drill chuck which will handle flat-

beaded rail drill 1 in. dia., each with one spare rail drill chuck and six drills of 1-in. dia.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Lu, Taipei, Taiwan. The tender No. is GFA-6185. The closing date is January 19, 1960. The Board of Trade reference is ESB/30638/59.

1 portable rail end hardening machine, petrol engine, 6-cylinder, 100 h.p. at 1,800 r.p.m., complete with accessories and spare parts.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan. The tender No. is US-692. The closing date is January 25, 1960. The Board of Trade reference is ESB/30300/59/I.C.A.

From Costa Rica:

2 $\frac{1}{2}$ -ton diesel locomotives

2 10-ton diesel locomotives both for work in tunnels.

The issuing authority and address to which bids should be sent is La Proveeduría, Instituto Costarricense Electricidad, San José. The tender No. is 447. The closing date is February 2, 1960. The Board of Trade reference is ESB/30322/59.

From Australia:

1 heavy-duty tyre lip rolling machine with spare rollers, bearings, and so on, and optional extra equipment and attachments.

The issuing authority and address to which bids should be sent is the Secretary, Commonwealth Railways, 623, Collins Street, Melbourne, C.I., Victoria. The tender No. is ME-1403. The closing date is January 19, 1960. The Board of Trade reference is ESB/29685/59.

From Lebanon:

120 sets of compressed air brakes for goods wagons of D.H.P. and N.D.T. Railways.

The issuing authority is the Chemia de Fer D.H.P. et Gerance du Réseau N.B.T. Bids should be sent to the Directorate of Railways, Rue Arwam, Beirut. The closing date is January 14, 1960. The Board of Trade reference is ESB/30599/59.

From Iran:

A large quantity of permanent-way equipment.

The issuing authority and address to which bids should be sent is the Iranian State Railways, Tehran. The closing date is February 7, 1960. A deposit of 32,500 rials is required. The Board of Trade reference is ESB/30791/59.

From Turkey:

10 postal vans.

The issuing authority and address to which bids should be sent is the P.T.T. Administration Umum Müdürlüğü, Malzeme Dairesi Reisliği, Ankara. The closing date is February 3, 1960. The Board of Trade reference is ESB/287/60.

From Egypt:

An unspecified quantity of locomotive materials.

The issuing authority is the Egyptian Republic Railways. Bids should be addressed to the Purchases & Stores Department, Railway Buildings, Fifth Floor over Shoubra Subway, Shoubra, Cairo. The

tender No. is E.R. 321.G.8/2/1391. The closing date is February 4, 1960. Local representation is essential. The Board of Trade reference is ESB/391/60.

Further details relating to the above tenders together with photo-copies of tender documents can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1.).

Notes and News

Expert Tool & Case Hardening Co. Ltd.—No dividend is being paid by the Expert Tool & Case Hardening Co. Ltd., on the $\frac{6}{11}$ per cent redeemable cumulative preference stock for the six months ended December 31, 1959.

British European Airways Proposed Helicopter Services.—British European Airways has applied to the Air Transport Advisory Council for permission to operate five helicopter services—from London to Paris, London to Brussels, London to Amsterdam, London to Birmingham and/or Manchester, and between Lands End and the Scilly Isles. It is likely that the first helicopter service of B.E.A. will be set up between Lands End and the Scilly Isles, in the summer of 1961.

Ninth National Electrical Engineers Exhibition.—The ninth National Electrical Engineers Exhibition to be held at Earls Court, London, from April 5 to 9, 1960, will be opened by the President of the Board of Trade, Mr. Reginald Maudling. For the first time there will be a feature of outdoor electrical equipment. An area of over 5,000 sq. ft. will be devoted to very large and heavy transformers built by the English Electric Co. Ltd. and other leading manufacturers. An 85-ton electric locomotive, built by Metropolitan-Vickers Electrical Co. Ltd. for shipment to South Africa, will be displayed for inspection by visiting engineers.

Transfer of Trading Activities of A.E.I. Companies.—The trading activities of three Associated Electrical Industries Limited (A.E.I.) companies; Siemens Edison Swan Limited; W. T. Henley's Telegraph Works Co. Ltd., and the Liverpool Electric Cable Co. Ltd., are now carried on directly by A.E.I. The manufacture and distribution of their products will continue through whichever of the following Divisions of A.E.I. is appropriate: Cable, Construction (Cables & Lines), Radio and Electronic Components, Telecommunications. The assets and liabilities in the United Kingdom of the three companies have been transferred to A.E.I.

Dorman Long & Co. Ltd.—Sir Ellis Hunter, Chairman, Dorman Long & Co. Ltd., states in his review, which has been circulated with the report and accounts, that the cut back in orders by British Railways continues to limited production of rails. The requirements of the National Coal Board are still restricted and there is room for improvement in orders for plates from shipyards. The bridge department is also having to meet keen price competition. A good deal of enquiry is circulating for bridges at home, chiefly in connection with the highway and railway modernisation programme. The final shipment of 30,000 tons of steel for the Durgapur steelworks in India has been

dispatched and the company expects to achieve its target dates for this important project. The group profits before taxation amount to £5,952,000.

Canadian Pacific Railway Company Ordinary Dividend.—The board of the Canadian Pacific Railway Company decided recently on payment of a final dividend of 75 cents a share on the ordinary capital stock in respect of the year 1959.

Maschinenfabrik Augsburg-Nürnberg A.G. Dividend.—For the year to June 30, 1959, the dividend by Maschinenfabrik Augsburg-Nürnberg A.G. (M.A.N.) is 14 per cent (12 per cent). Net profit was DM 10,510,000 (9,010,000) after depreciation DM 28,050,000 (29,850,000) and tax DM 40,940,000 (34,760,000). The report states that a certain decrease in orders from abroad has been cancelled out by more intensive activity in Germany.

Collision at Manchester Victoria Station.—A diesel train collided with a locomotive at Manchester Victoria Station, British Railways, London Midland Region, on January 10. Five people were taken to hospital and eight others were treated for minor injuries. The locomotive was putting an extra coach on the 2.50 p.m. Blackpool train when the accident occurred. No coaches were derailed. The diesel train, which had come from Rochdale, was damaged and had to be taken out of service, but the Blackpool train left only 3 min. late.

Part of Former M.G.N.R. Track to be Road.—Six stretches of the former Midland & Great Northern Railway are to be bought by Norfolk County Council to be turned into roads. The Council approved the purchase on January 2. The Chairman of the Highways Committee said it would be cheaper to convert the railway than improve the existing road. The new roads would be among the best in the county. According to the report before the Council, it would be dearer to use three of the six lengths than reconstruct existing roads. The committee considered the extra cost would be justified by the better alignment. The largest stretch would be from Aylsham to Potter Heigham.

Developments by Joseph Lucas (Industries) Limited.—The motor-vehicle chassis engineering business of Joseph Lucas (Industries) Limited has recently been augmented by the purchase of the tractor disc brake business formerly operated by Goodyear Tyre & Rubber Co. (Great Britain) Ltd. Also an agreement has been entered into with Associated Electrical Industries Limited and the General Electric Co., Ltd. for the manufacture of all-glass sealed-beam headlamps at a newly constructed factory for which capital is being jointly subscribed. A company has been formed in France, Roto Diesel S.A., for the manufacture of the C.A.V. distributor fuel pump for high-speed diesel engines.

Enfield-Standard Power Cables Limited Commences Operations.—Following the recent announcement of the merger of the power cable businesses carried on by Enfield Cables Limited (a wholly owned subsidiary of Enfield Rolling Mills Limited) and by Standard Telephones & Cables Limited respectively, a new company has been formed, Enfield-Standard Power Cables Limited. The new company, which commenced operations on January 1, 1960, has its registered offices at Connaught House, 63, Aldwych, London, W.C.2, and main works at Brimsdown. Mr. F. C. Wright, Managing Director of Standard Telephones & Cables Limited, and Mr. John Grimston, Managing Director of Enfield Cables Limited and

Enfield Rolling Mills Limited, will alternate as Chairman of Enfield-Standard Power Cables Limited. Principal officers of the company are Mr. E. C. Lee, General Manager; Mr. G. H. Bairstow, General Works Manager, and Mr. M. J. Smith, Commercial & Technical Manager.

Motive Power on the North Eastern Region.—With reference to the editorial note entitled "Informing the Public," which was published in our January 1 issue, we have been informed that there is no immediate prospect of using 2,200-h.p. diesel-hydraulic locomotives in the North Eastern Region of British Railways. A model of this type of engine was on exhibition during the meeting of the Yorkshire Area Transport Users' Consultative Committee which was the subject of the note, but it was displayed merely as an example for general interest.

High Duty Alloys Limited Change of Scottish Address.—High Duty Alloys Limited has closed its Hillington, Glasgow, office and opened a new one at De Quincey House, 48 West Regent Street, Glasgow, C.2. Tel.: Douglas 1500. This office will deal with all enquiries for Hiduminium sand, gravity, and pressure die castings, sheet, tube, and extrusions for Scotland and Northern Ireland. Enquiries for forgings in that area will continue to be dealt with by the Manchester office at Colwyn Chambers, 24 Mosley Street, Manchester, 2.

Permanent Way Institution Annual Winter Meeting.—The seventy-sixth annual winter meeting of the Permanent Way Institution will be held at the Institution of Civil Engineers, Great George Street, Westminster, S.W.1, on January 30, at 2.30 p.m. The chair will be taken by the President, Mr. C. E. Dunton. At the conclusion of the business meeting a paper on "Belgium and the Belgian State Railways," illustrated by lantern slides and film, will be given by Monsieur A. Jacobs, Ingénieur en Chef, Directeur de la Voie, Société Nationale des Chemins de fer Belges. In the evening a conversation will be held at the British Transport Commission headquarters, 222, Marylebone Road, N.W.1, at 5.15 for 6 p.m.

Mobil Oil Co. Ltd. Tank Wagon Trains to Midlands.—The illustration shows a British Railways Type "2" loco built by the Brush Electrical Engineering Co. Ltd., hauling a train of tank wagons, one of a series of regular workings from the Mobil Oil Co. Ltd. refinery at Coryton, Essex, to a distribution terminal at Coventry. The tank

wagons were built by the Powell Duffryn Engineering Co. Ltd. Each block train of 20 wagons transports nearly 120,000 gal. of petroleum products. The train is shown on the London Tilbury & Southend Line of British Railways, Eastern Region, now being electrified; supports for overhead electrical equipment can be seen alongside.

Winchester-Newbury Branch to Close.—The branch between Newbury and Winchester, of British Railways, Southern Region, is to be closed to passengers from March 7. The Transport Users' Consultative Committee for the South Eastern Area and the Central Transport Consultative Committee have agreed, after hearing evidence that the line is losing money heavily. The section is the southern part of the former Didcot, Newbury & Southampton Railway, which, before grouping in 1923, was worked and maintained chiefly by the Great Western, and in part by the London & South Western, Railways. Winchester Cheshil is one of the stations to be closed to passenger traffic.

Swansea & Mumbles Railway Closure.—To mark the closing of the Swansea & Mumbles Railway on January 5, the lessees of the undertaking, the South Wales Transport Co. Ltd., arranged a special trip over the line, for invited guests, followed by a luncheon in the Guildhall, Swansea, at which the Deputy Mayor, Councillor A. J. K. Hare, presided. The toast of the South Wales Transport Co. Ltd. was proposed by the Deputy Mayor, and Mr. N. T. James, Chairman of the company, responded. Mr. J. R. Hammond, General Manager, British Railways, Western Region, replied to the toast of "The Guests," proposed by Mr. James. Many local residents, and railway enthusiasts, took the opportunity to travel on the railway during the evening of January 4, and again early next morning. The demolition of the track, equipment, and rolling stock is being carried out by Thomas W. Ward Limited.

Festiniog Railway Society Annual Meeting.—A special train will be run from Paddington to Minfordd on April 30, in connection with the annual general meeting of the Festiniog Railway Society Limited. The train will leave Paddington at 8.12 a.m. and call at High Wycombe (8.48), Birmingham (Snow Hill) (10.36), Wolverhampton (Low Level) (10.49), Shrewsbury (11.27), and Ruabon (12.6 p.m.), arriving at Minfordd at 2.50. Special trains will run over the Festiniog Railway to afford an opportunity of inspecting the line and works. The meeting will



Block train of tank wagons from Mobil Oil Co. Ltd. refinery at Coryton, Essex, to Coventry, hauled by Type "2" diesel-electric locomotive

take place at Portmadoc in the evening. The return train will leave Portmadoc at 10.15 p.m. and Minffordd at 11.10 p.m. It will be due Shrewsbury at 3.9 a.m., Wolverhampton 3.56, Birmingham 4.20, High Wycombe 6.8, and Paddington 6.50; and call also at Leamington Spa and Banbury. Special excursion fares are offered. Refreshment facilities will be available. Particulars may be obtained from Mr. H. T. S. Bailey, 80, Bessborough Place, S.W.1.

The Faraday Lecture, 1959-60.—The Faraday Lecture will be presented this year by Professor M. G. Say, at the Central Hall, Westminster, London, on February 17. The subject will be "Electrical Machines." Admission will be free by ticket available from the Institution of Electrical Engineers, Savoy Place, London, W.C.2. Professor Say is Professor of Electrical Engineering at the Heriot-Watt College, Edinburgh.

Adlington (Cheshire) Goods Depot to Close.—Adlington (Cheshire) goods depot, between Macclesfield and Stockport, on the former L.N.W.R., now in British Railways London Midland Region, is to be closed from February 1. Alternate arrangements for goods traffic will be made at Macclesfield for traffic requiring B.T.C. cartage and at Poynton for full loads station to station. Coal, coke, and patent fuel will be dealt with as consigned by senders.

Manufacturing and Marketing Arrangements in the U.K. for Surform and Surocut Tools.—The manufacture and marketing in the United Kingdom of Surform and Surocut surfacing and cutting tools has been transferred from Simmonds Aerocessories Limited to Firth Cleveland Tools Limited. Both companies are members of the Firth Cleveland Group. The Surform and Surocut Home Sales Office continues to be at the Group Headquarters, Stornoway House, Cleveland Row, London, S.W.1.

Gallantry Award to British Transport Police Constable.—A Royal Humane Society award for saving a woman from drowning in the Thames in April of last year has been presented to Police Constable Robert Edwards, of the British Transport Police. The presentation was made by Mr. K. W. C. Grand, Member of the British Transport

Commission and Chairman of the B.T.C. Police Committee, on the occasion of the passing-out parade at the British Transport Police College, Tadworth, Surrey, on January 7. P.C. Edwards, who is stationed at B.T.C. Police Headquarters, previously received a commendation for assisting the Metropolitan Police.

Changes in Wakefield Castrol Group Works Administration.—The Wakefield Castrol Group announce the formation of Group Works Division, responsible for the overall administration of its 12 production centres in the United Kingdom. This move is the result of expansion in the productive needs and resources of the group over recent years. Mr. C. R. Woodfield has been appointed General Manager of the new Division and Mr. H. G. Priest is Manager of its Production Department, based at Castrol House in London.

Institution of Locomotive Engineers Symposium on the Use of Aluminium in Railway Rolling Stock.—A Symposium on the use of aluminium in railway rolling stock will be held by the Institution of Locomotive Engineers and the Aluminium Development Association on May 27, at the Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, from 10 a.m. to 5 p.m. Members of the Institution of Locomotive Engineers and of the Aluminium Development Association and visitors will be admitted by ticket, for which there will be a registration fee of £1 for each person. Application forms for members wishing to attend the Symposium and full details of the programme will be circulated to members later.

Radio Telephony for Toton Yard, L.M. Region.—The first radio telephony system in a marshalling yard in the London Midland Region of British Railways was put into operation at Toton Yard on January 11. There is two-way radio communication in the up sidings between the hump room, and control tower and the two diesel engines engaged in shunting trains over the hump. Instructions being passed over the radio system can be heard at all locations. The installation does not supersede the use of fixed and hand signals, but is an adjunct to them, used to issue instructions in detail which cannot be conveyed by present con-

ventional means. When the system has been completed, and experience gained, consideration will be given to its being extended to the down sidings, using a different wave-length. The radio equipment on the engines is readily interchangeable, two sets being provided for daily use, and one held as spare. There are 15 diesel engines on the complement at Toton, any one of which might be used for shunting at the up bank, and provision has been made for any engine to be fitted with a radio telephone set at short notice.

Nigerian Railway Corporation London Office, Change of Address.—The Nigerian Railway Corporation has announced that the address of its London representative has been changed to Nigeria House Annex, Fourth Floor, The Adelphi, John Adam Street, London, W.C.2, tel. Trafalgar 5644.

Correnda Continuous Tiling System to be Exhibited at Manchester.—Corrosion Limited has arranged an exhibition at the Midland Hotel, Manchester, on February 15-19, to show its Correnda continuous tiling system for upgrading wall and ceiling surfaces from the point of view of hygiene and resistance to high humidity.

Manufacturing Licence Granted by Davey, Paxman & Co. Ltd.—Davey, Paxman & Co. Ltd., of Colchester, has granted a further manufacturing licence for its diesel engines. The latest licensee is Ets. Dujardin et Cie, of Lille, France, who will manufacture the Paxman 7-in. bore range of engines for oilfield, rail traction, marine, and industrial purposes for sale in France and French overseas territories.

Closure of Selby - Cawood Branch.—British Railways, North Eastern Region, announces that because of the loss which is being incurred it is necessary to withdraw the freight facilities from Cawood Goods Station and Wistow Public Delivery Siding from May 2. On the same date the line from Selby West Signalbox to Cawood will be closed. Full wagon-loads of goods traffic will be dealt with at Selby. Parcels and small consignments will continue to be collected and delivered by British Railways' road vehicles based on Selby.

Purchasing Officers Association Conference.—The second conference of the European Federation of Purchasing will be held in Scheveningen, Holland, on April 21-23. Among the sessions will be: "Common Problems of Buyers in Europe," by the President of the Federation, Monsieur Paul Gros, Purchasing Director, French National Railways; and "The Organisation of Purchasing Department: Selection and Training of Personnel," by Mr. J. Murray Grammer, Director-General of Purchasing & Stores, National Coal Board. Details may be obtained from the Secretary, Purchasing Officers Association, Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

B.I.M. Staff Grading Conference.—Problems that arise from running staff grading schemes, the comparatively small extent to which such schemes are used by British industry and commerce, and the advantages and disadvantages of existing schemes will be discussed at a one-day conference of the British Institute of Management on January 18 at the Connaught Rooms, London, W.C.2. The conference will be opened at 10 a.m. by the chairman, Mr. Gerald R. Moxon, Industrial Relations Officer, United Glass Limited, and Chairman of the B.I.M. Human Relations Advisory Committee. At 10.20 a.m. Mr. A. G. P. Elliott, Chief of Personnel & Training, Simon-Carves Limited



Mr. K. W. C. Grand presenting a Royal Humane Society certificate to Police Constable Robert Edwards

will speak on "Staff Grading—design of a scheme and factors likely to effect it." This will be followed by a general discussion led by Mr. J. Cresce, an American authority on the subject at present with Monsanto Chemicals Limited. The afternoon session will open at 2.15 p.m., with a paper by Dr. A. S. Roy, Group Personnel Officer, British Oxygen Co. Ltd., on "Staff Grading—how to introduce a Scheme." At 3.15 p.m. there will be an open discussion.

Institution of Locomotive Engineers Annual Luncheon.—The annual luncheon of the Institution of Locomotive Engineers will be held at the Dorchester Hotel, Park Lane, W.1, on Friday, March 4, at 12.40 for 1 p.m.

The Society of Engineers.—The inaugural meeting for 1960 of the Society of Engineers will be held in the apartment of the Geographical Society, Burlington House, London, W.1, on Monday, February 1, at 5.30 p.m., when Mr. E. G. Massy will deliver his Presidential Address. Mr. Iain C. Cocking, Past-President, will present the Premiums awarded in 1959.

Collapse of Scaffolding at Manchester London Road Station.—Six men fell about 50 ft. to the platform below at Manchester London Road Station, British Railways, London Midland Region, on January 6, when scaffolding above which they were working gave way. One of the men escaped with shock, but the others suffered serious multiple injuries. The men were engaged in stripping glass panes from the roof of the station for its reglazing as part of the reconstruction programme.

Beckett, Laycock & Watkinson Limited Factory Extension and Offices.—A brief ceremony took place recently to mark the official opening of the new 35,000 sq. ft. extension to No. 1 Factory and head offices of Beckett, Laycock & Watkinson Limited, of Acton Lane, N.W.10. The extension consists of factory space, a new office block on two floors, drawing offices, showroom, canteen and social centre, and a garage and car park. The unveiling of a commemorative plaque was performed by Patrick R. Beckett, grandson of the Chairman and Founder, Mr. J. E. Beckett, and son of the Managing Director Mr. R. A. Beckett.

Extension of British Railways International Express Parcels Service.—A simplified tariff for British Railways international express parcels service, and an extension of the service to all stations in Britain and also to additional stations in Western Europe, excluding Spain and Portugal, has now come into operation. The inclusive throughout charge can be paid in advance in sterling and only a single consignment note is required. Hitherto the service has been restricted to a limited number of stations in Britain and on the Continent. The service assures speedy despatch of parcels by express passenger train connections with British Railways steamship services from Harwich, Dover, Folkestone, or Newhaven.

Transport Brakes Limited Silver Jubilee.—To celebrate the 25th anniversary of Transport Brakes Limited, a celebration dinner was held at the Grand Hotel, Bristol, on December 7, attended by the directors and employees of the offices and factory and their wives. The toast of "The Company" was given by Sir A. William Grant, and the response by Mr. G. H. Bird, the General Manager. The health of the guests was proposed by Mr. W. T. Wilkes, Director, and replied to by Mr. G. C. Ehlers, whose firm has been accountants to the company since its inception. Mrs. Trist, widow of the founder of the firm, was unable to be present

through illness, but her two daughters, Mrs. Bird and Mrs. Williams, who are directors of the Company, were present. The other Directors are Messrs. H. R. Burton, J. A. Hayward, and R. J. Elmes.

A.B.C. Coupler & Engineering Co. Ltd., London Office.—The address of the London office of the A.B.C. Coupler & Engineering Co. Ltd., is now 22, Headfort Street, S.W.1. The temporary telephone number is Belgravia 3316-7.

Kilsby & Crick Station to Close.—Kilsby & Crick Station, between Rugby Midland and Northampton, British Railways, London Midland Region, is to be closed for passenger and parcels traffic from February 1. Parcels and passenger train merchandise will be dealt with at Rugby. Buses operate in the area.

East Yorkshire Motor Services Limited, Improved Result.—The net profit by the East Yorkshire Motor Services Limited, for the year to September 30, 1959, is £45,267 compared with £10,850 the previous year. The dividend is 5 per cent free of income tax (nil). The good summer weather and two fares increases in December 1958 and April 1959 have jointly made possible the increase in revenue from £1,011,490 to £1,052,229.

New Layout for L.T.E. "London Diary" Poster.—London Transport Executive has changed the layout of the well-known "London Diary" poster which appears monthly on Underground stations and other sites. The poster gives information on current events such as exhibitions, concerts, and sports fixtures. The new layout of the poster, listing events for January, is in black type on a yellow ground. The London Transport bullseye symbol is in black and yellow on a white ground at the top, and again in white as a background in the lower half. The poster replaces the former tear-off dairy motif. It was designed at the London School of Printing & Graphic Arts by Jonathan Nicol, and, like earlier posters in the series, was printed by the Baynard Press. The L.T.E. "roundabout" poster, which makes suggestions for short

excursions within London, is to appear in a new format shortly.

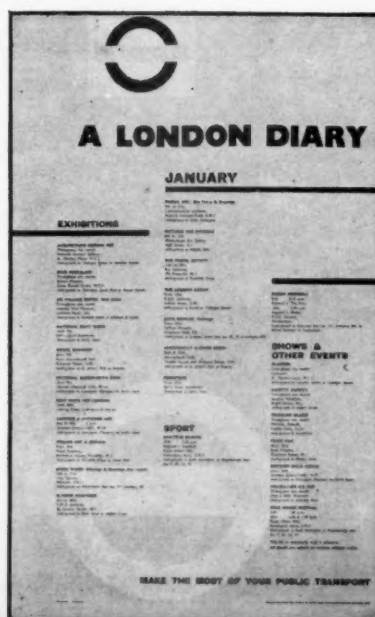
Butler Machine Tool Co. Ltd. Results.—An ordinary dividend of 17½ per cent (as before) is declared by the Butler Machine Tool Co. Ltd., payable on January 23. Profits for 1958-59 were £86,075, against £88,810 for the previous year, after tax of £67,232 (£111,232).

James H. Randall & Son Ltd., Reorganisation of Sales Force.—James H. Randall & Son Ltd. has reorganised its outside sales force and is now served as follows: Mr. D. C. Lowes: Kent, Essex and London postal districts excluding N., N.W., N.E., S.W. (South of the Thames); Mr. S. G. Medcraft: Surrey, Sussex, Hampshire, Berkshire and S.W. London postal districts (South of the Thames); Mr. R. M. Palmer: Midlands and Western Counties; Mr. N. M. Young: Middlesex, Hertfordshire, Bucks, Bedford and N. and N.W. London postal districts.

Hunting Surveys Limited.—Amalgamation has taken place of Hunting Aerosurveys Limited and Hunting Geophysics Limited into one operating company, Hunting Surveys Limited. The two companies have been closely associated for many years. Hunting Surveys Limited is responsible for all debts and commitments of the two former companies and provides all the services to clients previously given by the two concerns. All existing contracts entered into by either company will be carried out on the same terms and conditions by Hunting Surveys Limited.

Cleanliness and Tidiness Prizes for N.E. Region Stations.—The "clean and tidy stations" competition in the North Eastern Region of British Railways has, again, been divided into two sections. One comprises the nine large stations in the Region: Newcastle Central, Darlington, York, Leeds City, Leeds Central, Hull Paragon, Bradford Exchange, Bradford Forster Square, and Sunderland. In this section Hull Paragon has, for the third year in succession, been awarded the first class prize. The trophy, which is awarded annually, has again been won by Hull. Darlington has been awarded the second class and Newcastle Central the third class prize. In the other section, 12 stations have been awarded first class prizes. Of the remainder, 36 gained second class and 130 third class awards. A further 97 stations received certificates of commendation. Points are awarded for such items as orderly arrangements on platforms, lines, garden plots, waiting rooms and offices; preservation of station equipment and stores; neatness in exhibition of timetable sheets, notices, and posters; and smartness of staff.

The Role of Nationalised Industries.—Sir John Elliot, Chairman of Thos. Cook & Son Ltd., and sometime Chairman of the former Railway Executive and of London Transport Executive, stated recently in an address to the Publicity Club, in London that the public must soon decide what it expected of State-owned industries—whether these were expected to make profits or to be run as public services where profit was not the major issue. No one, he added, would ever make up his mind about this problem. Politicians deliberately created ambiguities in Acts of Parliament, and the Acts which created the nationalised industries had never made the issue clear. It would be easier for L.T.E. or British Railways to make a profit if they were allowed to and they could be run within the framework of an ordinary private business. But the politicians did not know how to do what they wanted to do. "There are some of us," he said, "who were brought



L.T.E. "London Diary" poster for January

up in private enterprise, and who spent a very difficult and frustrating period trying to make these things work."

Crompton Parkinson Limited Rejoins C.M.A.—Crompton Parkinson Limited rejoined the Cable Makers Association on January 1, 1960.

Derailment on the New York Central Railroad.—An east-bound passenger train of the New York Central Railroad was derailed while travelling at speed near Wellington, Ohio, on January 10. Four passengers were killed and more than 50 injured. The train was being switched to another track so that it could pass a freight train ahead of it.

Hale & Hale (Tipton) Limited.—Mr. R. C. Leppington, Chairman, Hale & Hale (Tipton) Limited, stated at the recent annual general meeting of the company that the year had been a most difficult one, but despite this the company had made progress, and the position today was much healthier than at the same time last year. Since the relaxation of purchase tax on commercial vehicles in the last Budget, there had been a steady increase in the order book. Within the industry demand was overtaking productive capacity, and delivery dates were being continually extended. The final dividend of 15 per cent, making 20 per cent for the year, and a capital bonus of 3s. a share were approved.

Forthcoming Meetings

January 19 (Tue.).—Railway Correspondence & Travel Society, Sheffield Branch, at Livesey Clegg House, Sheffield, at 7.30 p.m. Paper on "The Gresley locomotives of the L.N.E.R.," by Mr. J. H. Turner.

January 19 (Tue.).—Institute of Transport, Scottish Section, at the North British Hotel, Edinburgh, at 6 p.m. Paper on "Work study in the transport industry," by Mr. W. Reid.

January 19 (Tue.).—Institution of Locomotive Engineers, at the Institute of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, at 5.30 p.m. Paper on "Some aspects of railway braking," by Mr. R. C. S. Low.

January 20 (Wed.).—Railway Enthusiast's Club, at 273, Farnborough Road, Farnborough, Hants, at 8 p.m. Paper on "C.T.C. on the Central Wales line," by Mr. E. A. Webster, New Works Assistant to the Signal Engineer, Western Region, British Railways.

January 20 (Wed.).—Institute of Mechanical Engineers, at 1, Birdcage Walk, Westminster, S.W.1, at 6 p.m. Paper on "The diesel engine in association with the gas turbine," by Mr. E. E. Chatterton.

January 20 (Wed.).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. Paper on "Civil engineering practice and problems on the Russian railways compared with those on British Railways," by Mr. M. G. Maycock, Chief Civil Engineer, British Railways, Scottish Region.

January 20 (Wed.) to January 21 (Thu.).—Institution of Electrical Engineers, measurement & Control Section, in co-operation with the British Computer Society, at Savoy Place, London, W.C.2, at 5.30 p.m. Discussion meetings on managerial and engineering aspects of

reliability and maintenance of computer systems.

January 20 (Wed.).—Peterborough Railway Discussion Group, at Peterborough Technical College, Eastfield Road, at 6.45 p.m. Paper on "Industrial psychology and human relations," by Mr. C. Wills, Senior Assistant (Internal Relations), Department of Public Relations Advisor, B.T.C. Headquarters.

January 21 (Thu.).—Institute of Transport, Bournemouth & Poole Group, at the Town Hall, Bournemouth, at 6.15 p.m. Paper on "Some aspects of railway transport," by Mr. A. C. J. Payne, Traffic Superintendent (Southampton), British Railways, Southern Region.

January 21 (Thu.).—British Railways, Western Region, London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Debate with South Wales & Monmouthshire Railway & Docks Lecture & Debating Society "That a modernised railway system will be unable to meet the challenge of other forms of transport."

January 21 (Thu.).—Model Railway Club, at Caxton Hall, Westminster, S.W.1, at 7.45 p.m. Paper on "Railways of Western Europe," illustrated with colour transparencies, by Mr. P. J. Kelley.

January 23 (Sat.).—Railway Enthusiast's Club, at 273, Farnborough Road, Farnborough, Hants, at 7 p.m. Paper on "The rectifier electric locomotive—its supply, control and merit," by Mr. D. B. McKenzie.

January 26 (Tue.).—Institution of Railway Signal Engineers, Bristol Section, at Chippenham, at 6 p.m. Paper on "Lifting barriers at level crossings in accordance with the requirements of Ministry of Transport & Civil Aviation," by Mr. S. D. Concha, British Railways, North Eastern Region.

January 27 (Wed.).—Southern Region, British Railways, Lecture & Debating Society, at the Chapter House, St. Thomas's Street, S.E.1, at 6 p.m. Paper on "The material for the job," illustrated by Mr. R. L. P. Cobb, Supplies & Contracts Manager.

January 27 (Wed.).—Peterborough Railway Discussion Group, at Peterborough Technical College, Eastfield Road, at 6.45 p.m. Paper on "Motive power modernisation," by Mr. C. H. Scutt, Motive Power Officer, Great Eastern, L.T.M.O., Liverpool Street.

January 28 (Thu.).—Permanent Way Institution, Nottingham & Derby Section, in the Midland Hotel, Derby, at 7 p.m. Paper on "Mechanical reballasting," by Mr. P. F. James, District Engineer's Office, Derby North.

January 29 (Fri.).—Permanent Way Institution, Hull Section, in the District Engineer's Shops Mess Room, Anlaby Road, Hull, at 7 p.m. Lecture with slides by Mr. William Morris, City Engineer, entitled "Municipal engineering."

January 30 (Sat.).—Permanent Way Institution all Sections in London. Council meeting (morning), annual winter meeting (afternoon), Conversazione (evening).

January 30 (Sat.).—Railway Enthusiast's Club, at 273, Farnborough Road, Farnborough, Hants, at 7 p.m. Paper on "Traffic operation—can it be work studied?" by Mr. F. Aldred, Work Study Assistant to the Regional Establishment & Staff Officer, Eastern Region, British Railways.

Railway Stock Market

Because of renewed talk of the possibility of an increase in the bank rate, which has followed a further upward trend of money rates in the U.S.A., stock markets showed a reaction. Declines in share values were small compared with recent gains, and the lower prices stimulated demand, but in general more caution has been in evidence. This was reflected in shares of engineering, locomotive building and kindred companies, though a number were again higher on balance, mainly because buyers were attracted by above-the-average yields.

Among foreign rails, Costa Rica ordinary stock gained a point at 22½. International of Central America reacted from \$24½ to \$22½, but the preferred stock improved from \$112½ to \$114½.

Guayaquil & Quito assented bonds eased to 80½d and Chilean Northern first debentures to 60½d.

Antofagasta preference stock was 30, the same as a week ago, but the ordinary stock eased from 17 to 16½. Mexican Central "A" bearer debentures kept at 55½, United of Havana second income stock at 6, Brazil Railway bonds at 7½ and San Paulo Railway 3s. units at 1s. 6½d. Paraguay Central prior debentures were again quoted at 16½.

Canadian Pacific strengthened from \$47½ a week ago to \$48½, but reflecting the easier trend in sterling securities, the preference stock came back from 57½ to 56½ and the 4 per cent debentures from 66½ to 66½. White Pass shares were 13½.

In other directions, West of India Portuguese capital stock was marked up from a point at 109½. Barsi Light Railway stock was again quoted at 29½.

Despite the easier trend in stock markets, Associated Electrical strengthened to 65s. 3d., which compared with 64s. a week ago, but General Electric eased 1s. at 45s. 3d. and English Electric at 49s. 7½d. compared with 52s. 9d. The market is awaiting terms of the expected plan to merge the aircraft interests of English Electric & Vickers. Vickers' shares were also lower, and at 37s. 10½d. compared with 39s. a week ago.

A feature was a sharp rise in North British Locomotive from 9s. 3d. to 12s. 6d. Beyer Peacock 5s. shares firmed up from 8s. 7½d. to 9s., but Charles Roberts eased from 19s. 9d. to 19s. 3d. and Westinghouse Brake from 59s. to 58s. 6d. Wagon Repairs 5s. shares at 15s. 3d. were virtually the same as a week ago, and Gloucester Wagon 10s. shares 15s. 3d. Birmingham Wagon remained at 29s.

Stone-Platt shares were prominent, having risen on balance from 60s. to 62s. 3d., but Tube Investments came back from 138s. 6d. a week ago to 135s. 3d. and British Oxygen lost a few pence at 83s. 9d. T. W. Ward reacted to 160s., and the 10s. shares of Dewcy Group from 52s. 9d. to 51s. 4½d. Moreover, reflecting the prevailing trend, Pre-Steel 5s. shares lost some ground, and at 42s. 6d. compared with 45s. 1½d. a week ago. Moreover, Pollard Bearing 4s. shares receded from 42s. to 40s. 6d. and Ransomes & Marles from 27s. 3d. to 26s. There was considerable activity in Ruston & Hornsby, which moved up to 40s.

OFFICIAL NOTICES

NEW ZEALAND GOVERNMENT RAILWAYS
TENDERS are invited from manufacturers of Locomotive Electrical Equipment for the supply of Diesel-Electric Equipment for 400-450 H.P. 3 ft. 6 in. gauge Diesel Electric Shunting Locomotives which are to be built in New Zealand by the Railways Department. Tenders are due to close in New Zealand on Friday, March 11, 1960, and specifications can be obtained on receipt of written application to:

The Chief Purchasing Officer, New Zealand Government Office (Ref. C/F.99/2783), Adelphi Building, John Adam Street, London, W.C.2.

